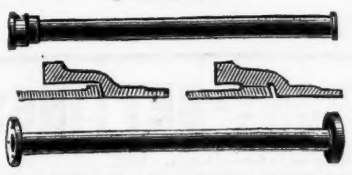
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXI. No. 1822.] LONDON, APRIL 12, 1898. [50TH YEAR. PRICE 6d.

GAS AND WATER PIPES
1¼ to 12 IN. BORE.



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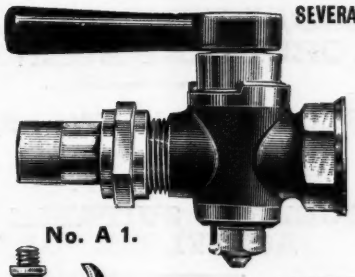
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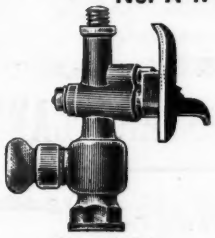
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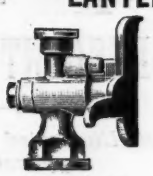
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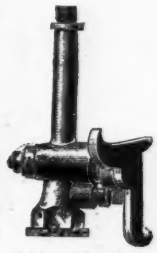
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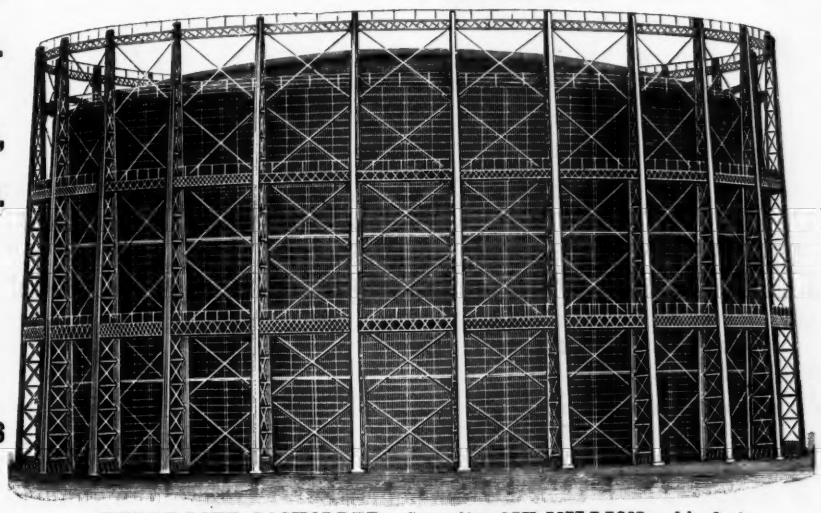

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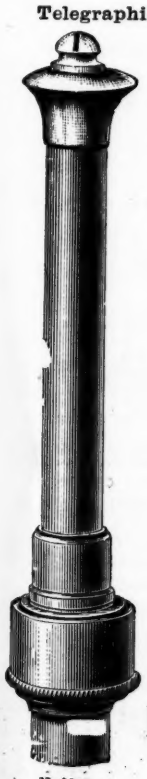

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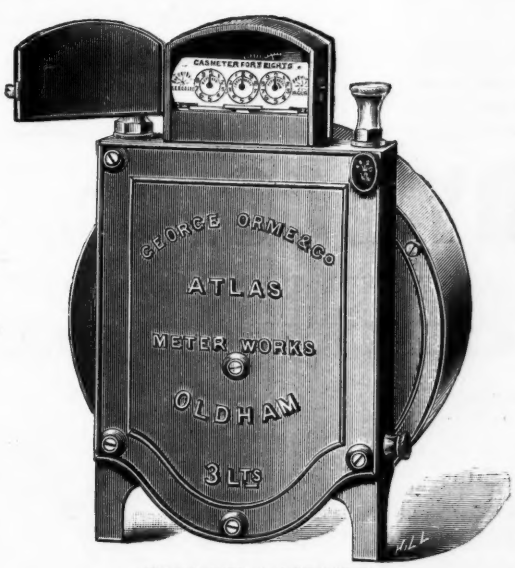

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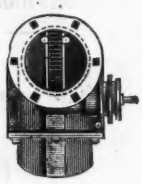

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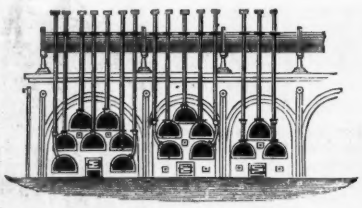

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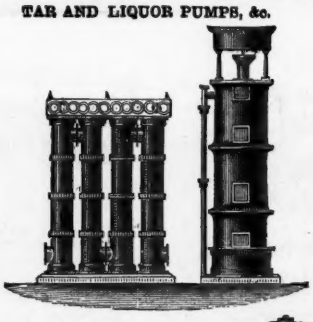

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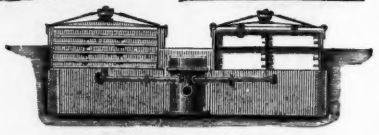

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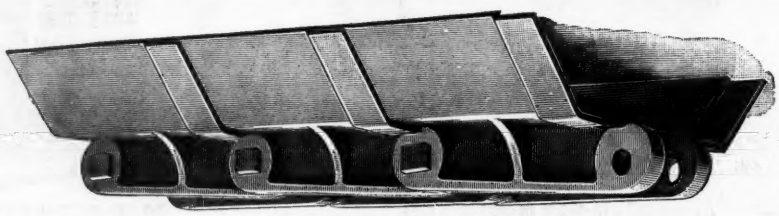

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OUT OF THEIR

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Analysis made by

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Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

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Yield of Gas per ton	10,500 cub. ft.
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Illuminating Power	16·9	Candles.
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Illuminating Power	17·8 candles.
Coke	70 per cent.

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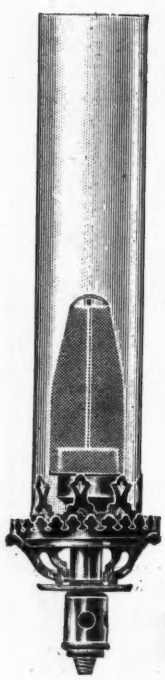

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MANTLES

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SUNLIGHT MANTLES

PRODUCE A DIFFUSED LIGHT OF SOFT RAYS,

The NEAREST APPROACH to the LIGHT of the SUN.

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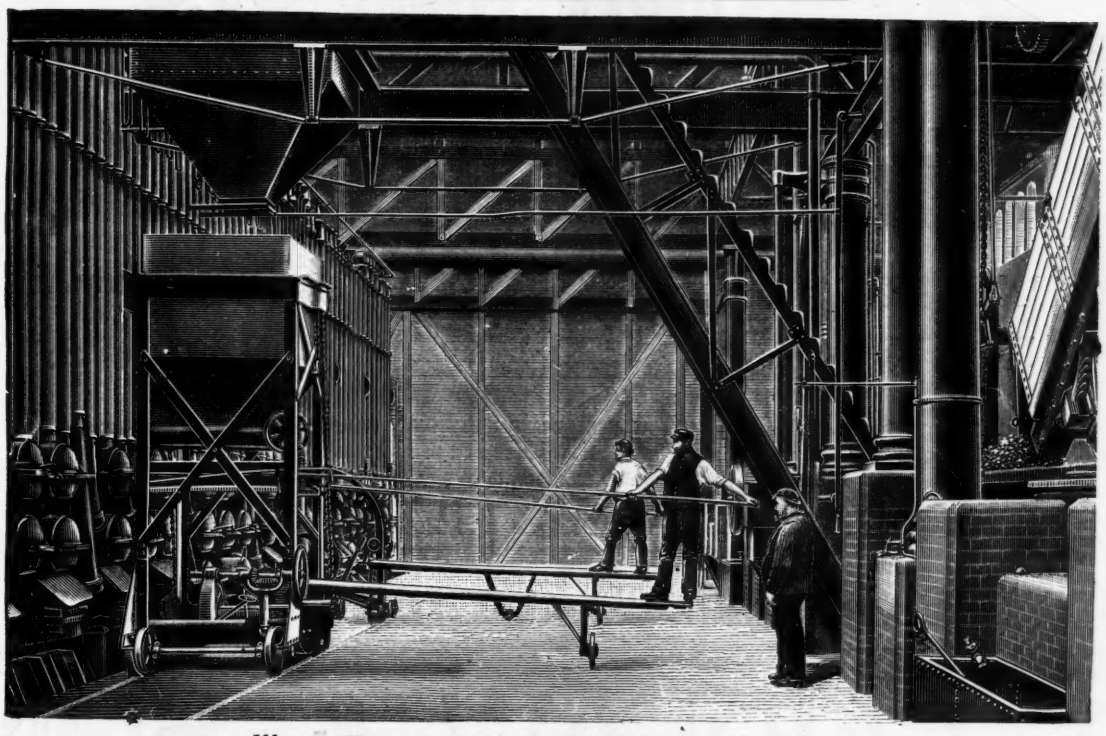
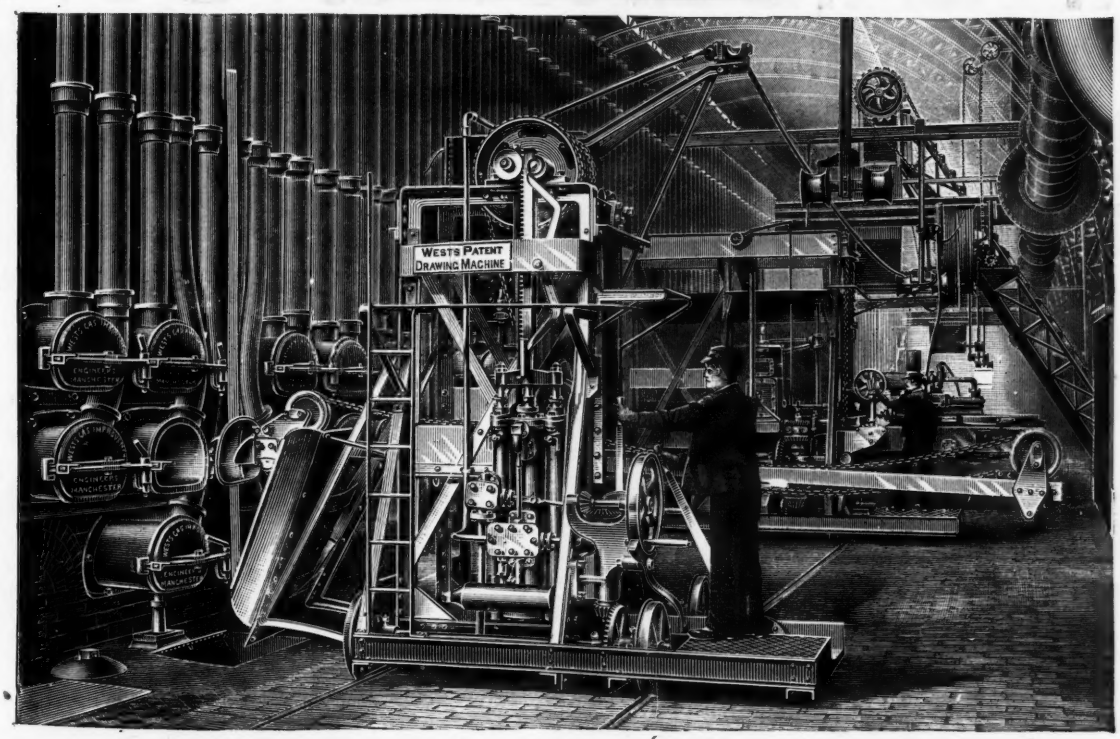


West's Manual Charging and Drawing Machines.



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COAL and COKE
Breakers, Elevators,
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EVERY DESCRIPTION OF
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We desire to call attention to our SHALLOW REGENERATIVE SETTINGS, which are comparatively inexpensive to erect, and productive of excellent results. They are specially designed to suit those Retort Houses where for various reasons it is undesirable to excavate to any great depth.

We shall be pleased to furnish Designs and Estimates on application.

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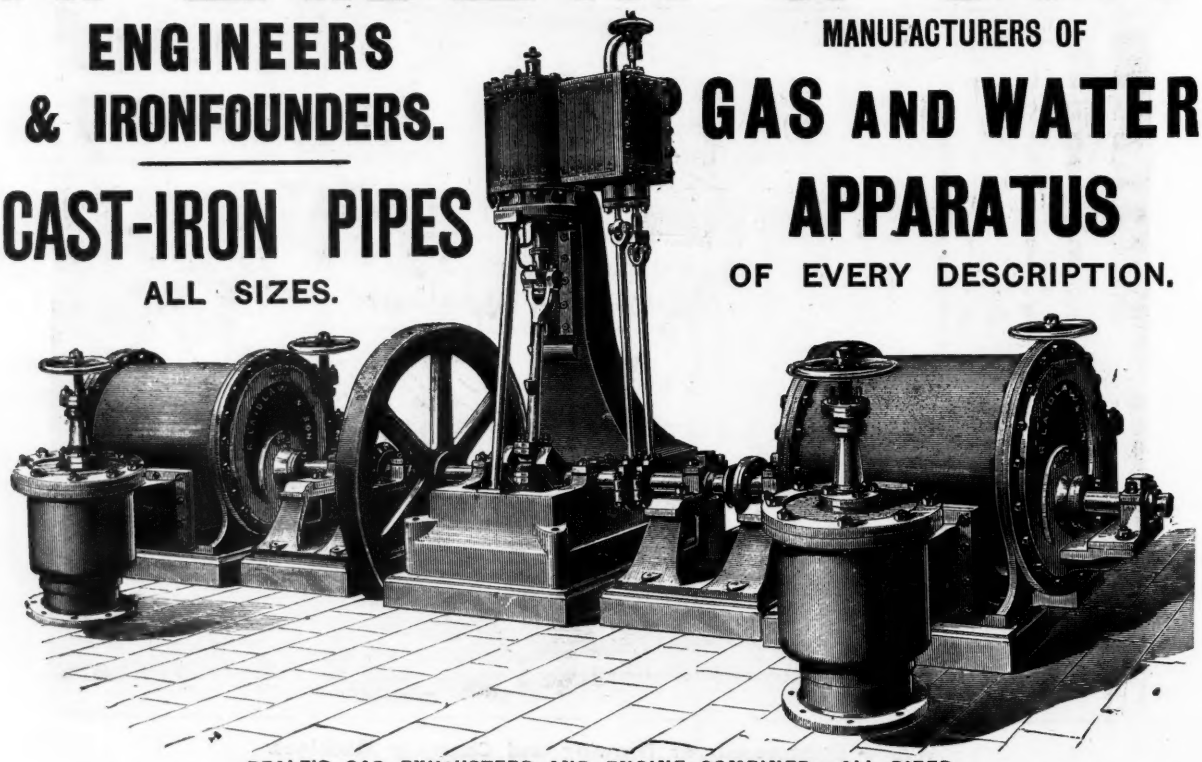

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IMPROVEMENTS IN STREET LIGHTING.

Highest Efficiency with Greatest Economy.

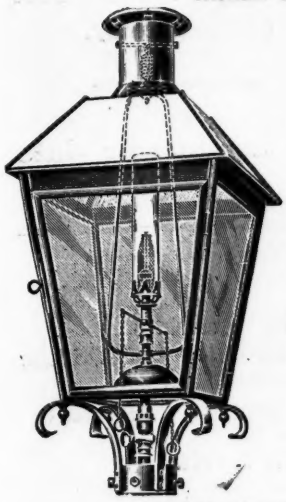
LIGHTING AUTHORITIES, GAS ENGINEERS, and GAS MANAGERS

are invited to inspect the

INCANDESCENT GAS-LIGHT

(Welsbach System),

which has now been successfully adapted to the purposes of

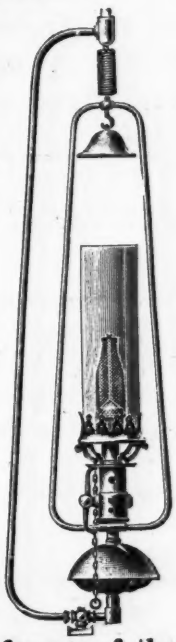


STREET LIGHTING,

the difficulties caused by VIBRATION having been OVERCOME by the use of the

NEW SPRING SUSPENSION FRAME (Patent).

This System of Lighting meets the requirements of all Lighting Authorities in those Districts where it is desired to effect an Improvement in Street Lighting WITHOUT INCREASE OF EXPENDITURE.



The following are Extracts from a PAPER read by Mr. F. G. DEXTER, before the SOUTHERN DISTRICT ASSOCIATION.

"The success of the experimental (Welsbach) lighting secured the contract for one of the Parish Council Districts; and this was shortly followed by the contract for three years for the city lamps. The total represents altogether about 500 single lamps, and 15 refuge lamps containing two lights."

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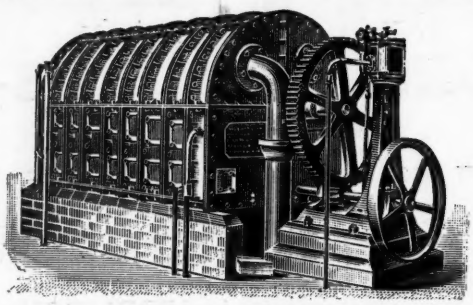

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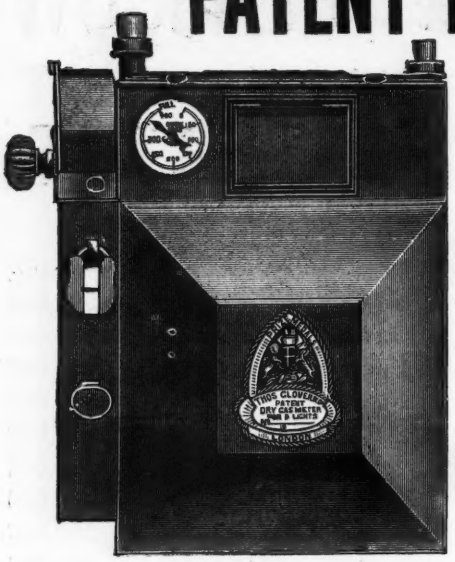

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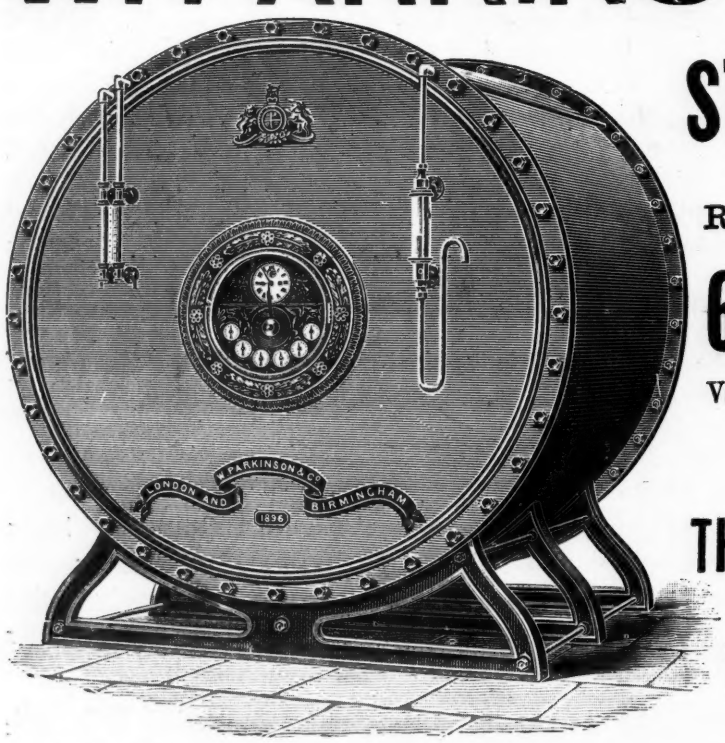

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EDITORIAL NOTES.

The Reply of the Chartered Company's Directors to Mr. Livesey's "Impeachment."

JUST as we were preparing the present number of the "JOURNAL" for press—earlier than usual on account of the Easter holidays—a copy was received of the promised reply of the Directors of The Gaslight and Coke Company to the "impeachment" of the Board by Mr. George Livesey at the last half-yearly meeting. We take the earliest opportunity of laying this important document, with its numerous appendices, before our readers (it appears on pp. 833-8), but reserve comment thereon till next week, in order that time may be afforded for seeing how far the charges brought by Mr. Livesey are met.

The Commercial Gas Company's Meeting—Consumers and the Sliding-Scale.

QUITE a holiday feeling pervaded the meeting of the Commercial Gas Company last Thursday. The attendance was meagre, the Chairman (Mr. John Blacket Gill) was most cheerful and confident, and not even the fact that £2172 will have to be drawn from the reserve to make up the £47,459 required to pay the usual dividends had a depressing influence. Had it not been for the reduced returns from residuals, the Company would have been, in spite of the mildness of the weather and the engineers' strike, in a fairly flourishing position; for the deficiency in the amount of profits needed for the dividends closely corresponded to the difference in the receipts for residuals in the comparative half years. The Chairman's address was almost barren of noteworthy points. Rumours have been afloat in the Company's district that they would soon have to follow The Gaslight and Coke Company in raising the price of gas; but Mr. Gill emphatically disclaimed all intention on the part of the Directors of doing so. And there is no reason within sight why they should—seeing that even in the recent "hard times" they can show a 4 per cent. increase in the consumption. The most interesting point in Mr. Gill's address was undoubtedly that as to the relative advantage which the Company's consumers and shareholders have derived in the past twenty years by the operation of the sliding-scale. A calculation had been made by the Secretary (Mr. H. D. Ellis), which showed that since 1877 the consumers have saved by reductions in the price of gas no less than £1,965,389—nearly 2 millions sterling!—while the total amount of the dividends paid to the shareholders in excess of the standard rates has been only £396,783. In our opinion, it would not be money ill-spent if the Directors took steps to bring this amazing comparison prominently before the Company's consumers, with an explanation as to its import. The people who speak of Gas Companies as "monopolists," and are constantly trying to incite the consumers to agitation against them, are ready enough to show how the sliding-scale works when "the boot is on "the other leg." An instance of this may be found in our report of the proceedings last week of the recent conference of Vestries at Clerkenwell; and therefore we would commend to the Directors the suggestion that they should inform the consumers how the sliding-scale has operated in the East-end.

Gas Managers in Session in Glasgow.

THE Informal Meeting of Gas Managers in Glasgow last Wednesday was the first held under Mr. Yuill's convenership; and everyone will be glad to learn that the institution, now fifteen years old, has not suffered by the change from Mr. M'Gilchrist, who engineered it into the prosperous position it now occupies. There was a large attendance, and an attendance, too, of happy gas managers; for there were no complaints of bad times, and no accounts of trouble, either from the weather or other causes. It may be, and probably will be, that when the financial year ends, some reports of decreased outputs of gas will be made. This is only to be expected, from the extraordinarily mild weather of the past winter. Except for it, there would have been a general increase. At the meeting, Mr. Hubert Pooley gave an unpretentious address, but one full of matters which lie close to the heart of the gas manager. As a consequence, the discussion which ensued upon it was excellent; for it

is the custom at these informal meetings to discuss the Chairman's remarks—indeed, the Chairman's address is put forward for that very purpose. A new feature was given to the meeting by the presence, in their official capacity, of the President of the North British Association of Gas Managers, and the Secretary of the Waverley Association of Gas Managers. This manifestation of fraternity is a welcome sign. It should be encouraged until the North British Association sees its way to take over the Informal Meeting, and make it the spring gathering of the Association. One or two things were made clear at the meeting. It is apparent that acetylene gas is not in very much favour in Scotland; and further that the vendors of water-gas plant have but little prospect of making much more headway. Inclined retorts did not command a great deal of attention; there being none in Scotland as yet. Perhaps by next year it will not be possible to say this, as there is every probability of their introduction into the new Edinburgh Gas-Works. There was another significant feature of the meeting. Next to no mention was made of electric lighting. It is no longer the bogey which it was a year or two ago; and gas managers can afford to pass it by in silence. Neither was there any reference to oil gas, which a few years ago was the leading topic. Oil-gas making has fallen upon evil times, on account of the great drop in the price of cannels.

Sir Vivian Majendie and Mr. A. Spencer on Oil and Lamps.

At the sitting of the Petroleum Committee on March 30, Colonel Sir Vivian Majendie completed his evidence-in-chief, the first portion of which was noticed last week. The Committee have adjourned over the Easter holidays; and upon their re-assembling it is understood that Sir Vivian is to attend for the purpose of cross-examination. This will conclude the inquiry; and the Committee will thereupon proceed to consider their report. It is Sir V. Majendie's opinion that, whether or not the minimum flash-point for burning oils is to be altered, or the sale of dangerous lamps prohibited, there is still the absolute necessity for amendment, on a somewhat extensive scale, of the general legislation respecting the trade in petroleum. He thinks the whole trend and weight of the evidence laid before the Committee is in favour of this judgment. The suggestion is that the Board of Trade should have powers to make general regulations as to the description, construction, ventilation, and lighting of ships, boats, or carriages used for the conveyance of inflammable liquids; while harbour authorities should have enlarged powers for making bye-laws in the same sense. The important particulars in which the existing law is radically defective, from this point of view, consist in the absence of any provision for controlling the storage or conveyance of mineral oil, the absence of any definite regulations of universal application to secure the safe keeping of inflammable liquids, and the defective provisions as to control by the Local Authority. To these must be added the absence of regulations to prevent the sale of dangerous or defective lamps. The question is, how far legislative interference with the trade can be usefully carried in the true interest of public security, without hampering the trade or raising the price of the commodity to consumers. Sir Vivian would leave the dividing-line between oil and spirit, at any rate for purposes of storage and transport, at the same flash-point as is now in force. He would require that all oil and spirit kept in bulk for trade, or for any purpose of manufacture or business, should only be stored on licensed premises. This would add one more to the increasing number of licences already required for carrying on a gas undertaking. The system of registration is commended to traders as being the mildest form of regulation which can be applied to any industry. This, of course, depends upon what follows registration. Sir V. Majendie observed that the legislative control of petroleum abroad is far in advance of anything existing in this country. This is undoubtedly true; but the statement does not in itself commend the idea of further legislative enactments for the British trade. Here we have an enormous commerce and industry, which has grown up without any legislative interference, except in regard to the flash-point. We refer now to the case of mineral oil as distinct from spirit. Trade considerations alone have operated to regulate the methods of transport, storage, and distribution of these oils, with the result that public security has not been prejudiced in any way. The most destructive petroleum fires have occurred in ports and Continental depôts regulated according to the severest standards of governmental responsibility. It would be deplorable if the conduct of a trade so important and so prosperous were to be hampered by superfluous restrictions.

At the same time, in all probability something will be done to remove or reduce the risks of lighting by mineral oil lamps. We have acknowledged the assiduity with which Mr. Alfred Spencer, of the Public Control Department of the London County Council, has followed up this question. His latest official views of the matter are contained in a "Further Report" now published, dated the 28th of January. This records the petroleum lamp accidents that occurred in London up to the end of last year, with observations upon the circumstances of the most serious cases. Mr. Spencer reviews the evidence in these cases, and the statements laid before the Petroleum Committee during the past two sessions. He concludes that "the whole difficulty has been caused by lowering the "flash-point in the Petroleum Acts from 100° Fahr. to "73° Fahr.;" and he thinks that "if the higher flash-"point had been retained, very few of the long series of "fatal and other lamp accidents in London and elsewhere "could have occurred." Upon the question of how the restoration of the flash-point to 100° Fahr. (Abel test) would affect the quantity, quality, and price of the article, Mr. Spencer is very positive. He admits that little conclusive evidence on the point was furnished to the Select Committee; and he endeavours to supply the deficiency. He says: "Within the past few weeks, one of the Russian "Oil Companies have introduced to the English market, "at prices competing with the cheapest petroleum oils, a "supply of Russian oil with a flash-point of 103° (Abel "test); and the Company claim that this oil is in all "respects equal, if not superior, to the oil now in general "use." The supply of oil of this character is alleged to be unlimited. It is also asserted that American oil may be made high-flash at no appreciable extra cost for refining. Upon these considerations, Mr. Spencer recommends that the flash-point should be raised to 105° Fahr., leaving the regulation of lamps a secondary matter.

The Private Bill Procedure (Scotland) Bill.

The subject of the reform of Private Bill procedure was once more before the House of Commons on Thursday, the 31st ult. The occasion was the motion of the Lord Advocate for the second reading of the Bill of the Government for amending the procedure in the case of Scotch Private Bills. This measure, which was mentioned in the Government programme for the session, is drawn upon lines materially different from those of any previous Bills (except that of last session which passed a Select Committee of the House of Lords), but follows those indicated in the minority report of the Joint Committee of 1888. It proposes that when parliamentary powers are sought for any Scotch matter, the initial step may be the lodging of a Draft Provisional Order at the Scottish Office. With the view of securing that no powers shall be granted inconsistent with the practice of Parliament, copies of the Draft Order are to be deposited at the Parliament Office and the Private Bill Office, so that the Chairmen of Committees of both Houses and the heads of the departments of State interested may consider the various proposals. If there is no objection to them from this quarter, the Provisional Order will be considered at a local inquiry held by a Board of three Commissioners. One of these is to be a Sheriff, who will preside; and the other two are to be laymen, taken from a panel of twenty periodically formed. Any modifications introduced into the Draft Order are to be again submitted to the Chairmen of Committees and the heads of the public departments. After all these safeguards have been observed, a Provisional Order may be made which shall become final, and have the effect of an Act of Parliament, unless within a specified time objection is taken to it, when the whole business may have to come before Parliament after all. Under the scheme set forth, it is claimed that the following objects will be realized: There will be a local inquiry before a competent, but not a permanent tribunal. No vested interests would be created. Parliamentary powers will be obtainable without coming to Westminster, if all parties are content; but yet the safeguards are adequate to prevent the legalization of provisions inconsistent with the practice of Parliament or the protection of public interests. Opponents will have

the right, subject to the liability for costs and to a veto by the Secretary for Scotland and the before-mentioned Chairmen jointly, to demand a parliamentary inquiry. Such inquiry would be single, by a Joint Committee, not double as at present.

It is scarcely to be wondered at that, when the Lord Advocate came to commend these remarkable proposals to the House, he found himself in a position of considerable difficulty. The Bill satisfies nobody, which is the fate of all projects for altering Private Bill procedure, whether for the United Kingdom as a whole or one of its parts. It is one thing to gird in general terms at the existing system on account of its costliness, centralization at Westminster, and other theoretical defects and shortcomings; but it is a different thing to devise an acceptable remedy. The first criticism that the present Bill suggests is that, if all the safeguards it offers are necessary, there must be something radically wrong with the scheme. Constructive legislation which requires to be fenced round with so many precautions against miscarriage is naturally suspect. It is the almost limitless power of Parliament that makes it respectable and respected. Reformers may argue that so much power is not needed to deal with the proposals of a small local Bill for acquiring (say) an acre of land compulsorily. But how can Parliament delegate its responsibility for seeing that justice is done to the smallest of its petitioners? If it is replied that Parliament must always, as in the present case, remain the ultimate authority upon the matters that are constitutionally disposed of by Bill, then the advantage of introducing intermediate stages in the procedure for reaching the final decision, of course, becomes questionable.

The best the Lord Advocate could advance by way of excusing his Bill was the time-honoured plea that it is "a very little one." But he must have been surprised at the chorus of disapprobation with which the poor little bantling of the Scottish Officer was received. Dr. Clark believed the Bill would increase the cost and delay, and complicate the procedure still further. Mr. Birrell styled it a revolutionary proposal to delegate to mere outsiders, and strangers who had no constituents and no particular responsibility, duties which had been very satisfactorily performed for several centuries by the House of Commons. He agreed that facilities for obtaining parliamentary powers cheaply should be given to small communities carrying out important public works. But these facilities are already given under the Public Health Act; and, "as far as "purely private enterprise is concerned, a little preliminary "expense is not a bad thing from the point of view of the "public interest." Mr. Cripps, as he would himself say, followed on the same side. Speaking from his experience at the Parliamentary Bar, Mr. Cripps declared that the principles involved in the Bill are so important, though they have been much overlooked in the drafting, that, "without some guarantees by the Lord Advocate at a later "stage, he should have to range himself on the side of the "opponents." More safeguards! Mr. Cripps denied that small interests need fear hard treatment by Committees of Parliament; asserting to the contrary that it is a special feature of the work of the Committees that they take even greater care of small interests than of the large railway and other corporations which come before them. With regard to the proposal to delegate the powers of the House to the Secretary for Scotland, Mr. Cripps won the applause of the House by declaring that "if there was ever a time in "the history of Parliament, now was the time when they "ought to be careful to draw a true distinction between "matters of legislation on the one side and matters of "administration on the other; and as far as the House had "the power and time, it ought to keep matters of legislation "in its own control." He warned the House against the insidious attacks of the official element. "If the House "was to keep in the future, as in the past, the regard and "confidence of the country in these matters, it must fulfil "its duty at whatever expense of time and trouble, and "honourable members must deal with legislation them-"selves; this being the duty which they had been "entrusted to carry out to the best of their ability." There is the ring of true statesmanship in this utterance. Mr. Cripps went on to allude to the various great statutory interests which had been created under direct parliamentary guarantee; and he protested against the attempt to deprive these enterprises of their protection.

Mr. Mellor, the late Chairman of Committees, agreed that the existing procedure of the House might be reformed with great advantage; but he objected to the provisions of the Bill. Mr. Courtney, Mr. Bryce, and several other speakers further criticized the measure. But we cannot spare more space for following the discussion here; the report in "The Times" conveys the best ideas concerning the whole problem of Private Bill procedure and its reform that have ever been put upon record. It might, indeed, be possible to extract from the debate material for framing into a promising scheme of amendment of this procedure.

The Companies Bill in Committee.

THE Select Committee of the House of Lords appointed to consider the Bill promoted by the Board of Trade for the amendment of the Companies Acts have taken more evidence on the working of the existing system. It is interesting to observe how the true character of joint-stock enterprise comes out in the statements of the experts who are assisting the Committee in their investigation. Many scandalous and shady things are done in company formation and management; but it is satisfactory to have the assurance of so high an authority as Mr. F. Beaumont Fletcher that "the great mass of companies are perfectly "honest, and most of those engaged in them are also "perfectly honest." The witness testifies from twenty years' experience, covering thousands of examples. He does not think that the proportion of fraudulent promoters is greater than 2 or 3 per cent. of the whole; and he is averse to legislation which would fetter and inconvenience business men who are forming and working companies. Starting from this point, it is natural that Mr. Fletcher should find many of the proposed restrictions of the Government Bill "difficult and harassing." With regard to the duties and liabilities of promoters, Mr. Fletcher's view is that they are not sufficiently aware of the nature of their position as it exists. Consequently, he is in favour of setting out in some detail what the obligations of promoters are; but he does not wish to carry the law farther than it now stands. With regard to the vexed question of holding directors responsible for exercising "reasonable "care and diligence" in their office, the witness had no objection to the words if they expressed the present state of the law; but if they went beyond the law, he would have none of them. The practical point is that if a person joins a directorate simply for what he can get, he has not the slightest regard for all the penalties in the Directors' Liability Act. The question as to whether an individual director has exercised reasonable care and diligence has never been put in a direct form to a jury. The broad contention of Mr. Fletcher and others who have taken the same view of company management is that clauses in a General Act imposing all sorts of new responsibilities on directors are only likely to discourage honest men, while rogues will not be afraid of them. There could not be a better illustration than that supplied by the whole tenor of Mr. Fletcher's evidence, of the difficulty of fitting remedial legislation to recognized evils without creating others.

"The Light that Failed."

UNDER the allusive title of "The Light that Failed," an Australian newspaper tells a strange story of an alleged gas swindle. The affair originated in a patent applied for in the names of George Washington Lee, Frank Elliott, and George Tatham, for a "process and apparatus for the "manufacture of inflammable gas and composition to be "used therein." The material part of the specification, which is dealt with more fully elsewhere, states that "the "apparatus comprises two essential features—viz., a pecu-"liarly constructed air supplier and moistener or pump, "and a generator, so arranged as to automatically manu-"facture the gas only as it is required for consumption or "storage. The process consists in impregnating atmo-"spheric air with as much aqueous moisture as it will hold, "and passing same through fine shavings saturated with "a specially prepared liquid composition." This composition is specified as consisting of a mixture of commercial sulphuric ether, citronella oil, and water, in the proportions of 1 oz. of each of the first two of the ingredients to 4 oz. of water. This description quite smacks of old times, when "new," "sanitary," and even "scented" illuminating gases were brought before the British public once or twice a year. Every gas expert who has passed his first youth must have recollections of the enthusiastic inventor who proposed to make an illuminating gas at a cost of a few

pence per 1000 cubic feet by "greasing air"—sometimes previously wetting the air, sometimes drying it, or cooking it, or confining himself simply to the sweet simplicity of a "cold process." Have we not seen these marvels even in Lombard Street—aye, and have not the Press viewers enjoyed many a "chicken and champagne" lunch on the strength of them? The latest of the Atmospheric Gas Companies, however, was brought out in Sydney, where it is reported the business was so adroitly worked that the original £10 shares in the Syndicate were run up to £90, and still found buyers.

But how, it may be asked, even in the actual deplorable state of ignorance of the public on gas matters, did the operators manage to persuade the people of Sydney that their new "invention" was likely to "bring about the "immediate annihilation of all existing Gas Companies, "and light the world with an illuminant, the power and "possibilities of which had never up to the present been "even dreamt of?" The newspaper explains the method of gas manufacture as follows: "It appears that, after "occupying a room in Elizabeth Street, the inventors "secured offices in Vickery's Chambers, Pitt Street. . . . "The versatile unloaders of a worthless invention had "engaged a room next to the one occupied by the Com-"pany, and by utilizing, it is alleged, a connecting door, "the generator of a meter, with which the experiments "were conducted, was constantly replenished with gaso-"line." It would not be the first time that a meter had been made to play the part of a "generator" of gas. The function of the "connecting door" is slightly mysterious; but even here the "inventors" could not claim credit for originality of conception; for is it not written in the history of the search after perpetual motion, that an ingenious swindler derived a considerable revenue from people who came to see his perpetual clock, which was wound up by means of a secret connection with the door that gave access to the room containing it? In the present case, however, the connecting door does not seem to have played a more occult part in the combination than that of providing means of access to the apparatus used by one of the "inventors," in the absence of the Directors of the Company, to fill the "generator" with petroleum spirit.

The whole story is the reverse of edifying. If it is true as reported, a not inconsiderable section of the moneyed people of Sydney, including the Colonial "Minister for "Public Instruction and Labour," who was one of the Trustees of the Company, were "had flying," by a set of vulgar swindlers. This particular Minister would do well to attend a few evening classes in elementary chemistry such as he would probably have under his official control. It is impossible to entertain the smallest sympathy for the dupes of this astonishingly successful gang of pretenders. If people will be so foolish as to believe every inventor of a "new gas" who tells them he is able to knock the established industry into a cocked hat by means of some hanky-panky tricks with "chemicals," they deserve to lose both their money and their reputation for common sense. Ignorance of the law excuseth no man when it is a question of right and wrong; and the same rule applies to cases of the kind under notice, when sixpennyworth of elementary instruction in the nature of things would prevent public men from making fools of themselves upon the invitation of "inventors."

WATER AND SANITARY AFFAIRS.

A PASSAGE in the address by the Chairman (Mr. George Banbury) at the half-yearly meeting of the East London Company last week, gives additional force to the statement made before the Royal Commissioners on the Metropolitan Water Supply by one of the witnesses, who asserted the political character of the London County Council. Mr. Banbury referred to a question lately asked in the House of Commons as to the alleged deficiency in the supply of water to East London. He was able to say that the accusation involved in this question, while eminently vague, was absolutely untrue. No localities were mentioned, and no names were given. The President of the Local Government Board, in common with the officials of the Company, had received no complaint, neither could inquiry discover any. The Company's storage reservoirs were all full, and the supply continuous—accompanied by no deficiency in pressure. Why then was any pretence made of a water famine? There is only one explanation, and that is sufficient. The report of a failure in the water supply was promulgated on the very eve of the County Council elections. We can only say this is scandalous. There was no fear of a water famine or anything approaching to it. The rumour was simply set going for a party purpose; and it actually reached as far as the House of Commons. It is like the old story that a lie will go half round the world before Truth can get its boots on. Perhaps the fiction served its purpose, and now for a season it will be allowed to rest. But it is a mischievous fact that the London Water Supply, as Mr. Banbury has expressed it, has been made "a party hunting-ground;" and it is to be feared it will so continue, as long as it remains a possession apart from Spring Gardens.

The prosperity of the East London Company is yet something which Progressive policy cannot impair. In the last half year there has been no drought, no frost, and "no parliamentary worries," unless we except the brief interlude just described. The increase of revenue has been remarkable, amounting to £15,000 for the year. So far the Company may be styled, as the Chairman intimated, distinctly "Progressive." How this comes to pass appears to be accounted for by two circumstances. In the first place, the supply is rapidly extending among new tenements on the east of the Lea, outside the Metropolitan area. Population is overflowing in this direction. A further cause favourable to the prosperity of the Company consists in the erection of a superior class of houses on some of the new estates. How cheap the water supply is to a large number of the humbler inhabitants of the Company's district is shown by the fact that the water-rates in respect of the poorer tenements, which are very numerous in the Company's district, are so low that 600,000 persons are being supplied with water at a charge which is rather less than one halfpenny per head per week. Taking the whole range of the Company's supply, the average charge is 5d. per 1000 gallons, or something like 1d. per ton. That the County Council, or any other public authority, would be likely to charge the consumer a lower price is disproved by the experience gained under the Corporations at Manchester, Liverpool, Birmingham, Leeds, and Nottingham. While furnishing a cheap supply to the consumer, and by careful management giving a dividend of 8 per cent. to their shareholders, the East London Directors are expending capital in the construction of works to secure the district against any deficiency in the supply. The extensive scheme of storage sanctioned by Parliament in 1894, was finished in September last; and the works for which power was obtained last year are in the initial stage.

The County Council may object that the East London Directors are carrying out a financial stratagem, adverse to the interests of the consumers, in their expenditure of capital. But the wisdom of enlarging the means of storage happens to be shown in a very striking manner by the letter which Mr. Baldwin Latham has just addressed to the "Standard." The works for which parliamentary powers were granted last year will be too late to meet the immediate necessity; but those completed under the Act of 1894 will be specially valuable as providing against the failure of subterranean sources in the coming autumn. Owing to the extraordinary deficiency in the rainfall for some months past, the water supply of the country, having regard to the period of the year, is declared to be in a "most deplorably deficient condition." Mr. Latham states that the volume of water now in the ground is as small as usually occurs at the end of autumn in the driest year; and unless there is an uncommonly wet summer, there must ensue a great deficiency of water in the summer and autumn months. In the geological formations which supply the River Thames, the springs are described as very low; but the case is still worse with the head waters of the Lea. Hence Mr. Latham predicts that in London and its neighbourhood, difficulties are likely to arise in continuing the water supply from some of the existing sources. Proof is thus afforded that the Metropolitan Water Companies are not wrong in extending their storage works; and there is evidently a special justification for the policy of the East London Company. The Metropolis is thus protected against a calamity to which the County Council would leave the great city and its environs still exposed. The question is particularly important as affecting the enormous population so rapidly multiplying in the outer area.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 843.)

DURING that portion of last week which was available for business, the Stock Exchange had a rather chequered time. There was a praiseworthy attempt to look cheerful at the opening; and by dint of making believe that Spanish affairs were a little more reassuring, prices were induced to move a fraction higher. But it would not last; and a heavier feeling was irresistible. The public stood aloof very shy; and even the professional operator was a bit nervous, and very cautious how far he should commit himself. The gradual hardening of money, pointing to a possible change in the rate, also exerted its effect. The depletion of gold had reached such a point, that on Thursday the Bank of England was compelled to raise its rate to 4 per cent. The 3 per cent. rate had lasted very nearly six months—viz., from the 14th of October, 1897. Business in Gas was about of average volume. On the whole, the tendency was in favour of an improvement in feeling. Changes in quotation are few and slight, and are for the most part in the less important issues; the leading stocks having done fairly well. Foremost among them, Gaslight "A" had a rally. It opened somewhat doubtfully on Monday, and was marked once at 280. This was good enough to attract buyers; and the figures hardened until the closing mark on Thursday was 284—the best of the week. The secured issues were not very strong; but the old figures held good. The Directors' reply to Mr. Livesey's charges was not out in time to have due study before business closed; and the food for reflection which it affords may be digested during the holidays. South Metropolitan was unchanged; but showed no sign of making an advance, and the debenture was one point easier. Commercials were hardly touched. The Company's meeting on Thursday (when the Chairman's exposition of affairs was regarded as quite satisfactory) concludes the history of the Metropolitan Companies for 1897. It may be briefly summed up thus: Increased sale of gas, marred only by bad markets for residuals. The Suburban and Provincial Companies were quiet and unchanged. The Continental undertakings were similarly situated, except that Cagliari had an advance. Among the rest, there were a few retrogressions—Cape Town and Buenos Ayres being the losers. Business in Water was altogether restricted. The tendency was not strong; and Grand Junction and West Middlesex receded.

The daily operations were: Business in Gas was very light on Monday; and prices were poor, but quotations did not fall. Tuesday was rather more active, and the tendency was a little firmer. The only move was a rise of ½ in Cagliari. In Water, West Middlesex fell 2. The general position on Wednesday was much the same as the preceding day; but South Metropolitan debenture and Cape Town fell 1 each, and Buenos Ayres ½. In Water, Grand Junction receded 1½. Thursday was fairly active, and made some show of better strength; but quotations closed without advancing.

ELECTRIC LIGHTING MEMORANDA.

The Prospects of Electric Traction on the Metropolitan Railway—Local Authorities Sceptical—Can Electric Lighting Undertakers Deal in Fittings without Special Sanction?

THE subject of the possible working of the Metropolitan Railway by electricity—which is the grand test of success for the application of electrical power to traction purposes—was brought before a Parliamentary Committee just before the Easter recess. The Metropolitan Railway Company are promoting a Bill the principal object of which is to make provision for the working of the line by electricity. This measure is the first-fruit of the departmental report drawn up last year by the Committee of experts who investigated the question of the best means of ventilating the underground portions of the line. The Committee recommended electric traction as the most satisfactory solution of the problem, so far as the public interest is concerned; and, very dutifully, the Company took the first opportunity for acquiring powers to carry out the recommendation. But in so doing they found they had to reckon with the Great Western Railway Company, with whom their relations are very intimate. The Great Western use the Metropolitan line as a feeder, and as the continuation of their own suburban system; and they objected to the proposal of the Metropolitan Company on the ground that if it were passed they might be required to convert all the steam rolling-stock which they use on the underground line into electric rolling stock. The fact of the objection being raised goes to show the opinion of electric traction entertained by the Great Western authorities. The evidence for and against the grant of the powers asked for was instructive. The Chairman of the Metropolitan Company held that if they made the change from steam to electric traction in the public interest, it would be equally right for the Great Western to do the same in regard to the few trains this Company run over the underground system in the course of the day. In any case, however, the Metropolitan proposal was confined to the underground portion of the railway. Ultimately, on the suggestion of the Committee, a clause for the protection of the Great Western interests was added to the Bill.

An interesting feature of the proceedings before the Committee was the appearance of representatives of Local Authorities to protest their want of confidence in the reality of the electric traction proposals of the Bill over which the two Railway Companies were raising such a pother. The Committee who investigated the subject of the ventilation of the line, in the report already mentioned, advised that, pending the introduction of electric traction for working the underground portion of the railway, the existing ventilation by means of blowholes made in the streets over the line should be continued and improved. The Railway Company, who fought before the Departmental Committee the question of the necessity for any improvement of the ventilation, sought powers in their Bill to carry out the latter recommendation. In the estimation of the Local Authorities, the Company were more disposed to stick to the blowhole apology for ventilation than to adopt electric traction. They would have preferred an order for the immediate suppression of the blowhole nuisance to any prolongation or improvement of the system, in the cause of the public interest. The Board of Trade, however, will have three years during which to watch the Company's proceedings in this regard. The Parliamentary Committee professed to be satisfied that the Company entertain the *bonâ fide* intention to introduce electric traction on the underground portion of their line, and have given them five years' grace, with the use of the blowholes, in which to effect the change. The Local Authorities would have nothing more to say to this Committee, but went their way to the next House shaking their unconvinced heads.

Recent legal proceedings taken against the Leicester Corporation for exceeding their statutory rights by selling electrical fittings, have aroused considerable attention on the part of the "trade" to the general question of corporation trading. The case, which is reported in our "Legal Intelligence," was determined by the County Court Judge upon the terms of the Corporation's Electric Lighting Order, which he interpreted as restricting the undertakers to dealing in meters. The decision has been appealed from, so that it is not open to discussion upon the merits of the particular case. We mention the matter here for the sake of referring to the recently published work of Mr. J. Shiress-Will, Q.C., entitled "The Law Relating to Electric Lighting," which should be in the hands of all persons interested in the subject. When we remark that the new book is for electric lighting law what "Michael and Will" is for gas law, there is no more to be said as to the trustworthiness of the manual. The extent to which the undertakers under any Electric Lighting Order may go into the ancillary business of supplying fittings to consumers is one of those matters which the general law does not touch. The undertakers *must* supply every consumer on demand with an appropriate meter, with the necessary fixtures and connections. This is the law. But the Electric Lighting Acts say nothing to favour the idea that, without special enactment, undertakers have anything whatever to do with any other fittings. It must be understood that we have nothing to say in this connection concerning the powers of the Leicester Corporation or any other undertakers of electric lighting under their own Order. A curious point was made in this case of a conspicuous entry in the prescribed form of accounts framed by the Board of Trade, which stands thus, on the credit side of the revenue account: "6. By sale and repairs of lamps, arc or incandescent. By sale and repairs of other apparatus." It was argued that this entry, inasmuch as it contemplated dealings in lamps and fittings by the undertakers, inferentially sanctioned the transaction. The Court held, however, that the inference could not be sustained. This litigation draws attention to the fact that the draft Provisional Electric Lighting Order, unlike the draft Gas Order or Act, does not contain a clause defining the nature of the business engaged in by the undertakers. Followers of the gas industry are familiar with the clause in question, which, often with apparently superfluous verbiage, recites what it is that the undertakers purpose to engage in, and what they propose to sell. The clause is entitled "General Purposes of the Company;" and is sometimes cut down to a few general words, which is wise. So far as Mr. Shiress-Will advises us, however, there is no such general prescription in the law of electric lighting; and the Judge of the Leicester County Court declines to allow the Corporation to act as if they had it for their guidance.

Professor Lewes on Water Gas.—A paper on "Water Gas and its Applications" is to be read by Professor Lewes at the Society of Arts on the 11th prox.

Imperial Continental Gas Association.—At the forthcoming meeting of the Association, the Directors will recommend a dividend of 5 per cent. for the half year ending Dec. 31 last, free of tax.

Train Lighting by Acetylene Gas.—For the past two months passenger trains on the Pontiac Pacific Junction Railway, from Ottawa to Waltham, Ontario, have been lighted by acetylene gas. According to Mr. P. W. Reseman, the General Superintendent of the Company, the result is most satisfactory.

JOHN METHVEN.

It is our sorrowful duty to have to chronicle this week the death of Mr. John Methven, M.Inst.C.E., the Engineer of the Beckton works of The Gaslight and Coke Company. The sad event occurred on the 4th inst. at Brighton, where deceased had been staying some time in order, if possible, to alleviate, by rest and change, the suffering to which he had long been subjected through a serious affection of the heart. It was early in June last that, on medical advice, he left Beckton—his Directors then granting him three months' leave of absence, which was afterwards extended to the end of June next. At the termination of this period, it was the intention of the Board to concede to him a retiring allowance. But the enjoyment of the means thus open to him of securing repose from his labours was not to be his; for he passed away calmly in sleep on the date named. Except those who were intimately acquainted with him, no one who saw him a few months since would have imagined that his fine and robust-looking *physique* concealed a treacherous disease which would claim him as its victim at the comparatively early age of fifty-three. But so it is; and the gas industry is to-day the poorer by the loss of one who was a busy worker and deep thinker, and who was respected by his professional brethren—apart from the honourable position to which he attained—for the independence of opinion which he ever displayed both in his writings and utterances.

The name of Methven has long been associated with gas engineering; and it is not too much to say that the holders of that name have left their impress upon the methods and practice of gas manufacture and supply. The father of the subject of this article—Mr. David Methven—was the Engineer of the St. Pancras works of the old Imperial Gas Company, and the lessee of the Portsea Island Gas-Works; and he was numbered among the leaders of the profession of that time. After serving an apprenticeship with the engineering firm of Walter Mabon and Co., of Manchester, Mr. John Methven continued his training under the guiding hand of his father at St. Pancras; and it was the care which was at this time bestowed upon him, combined with his own industry, which prepared him for the prominent position he was destined to occupy.

In stepping out into the world, we believe his first appointment was as an Assistant at the Bankside works of the then Phœnix Gas Company; and a few years later he was filling the position of Secretary and Engineer of the Redhill Gas Company. His next engagement was as Engineer of the Gravesend Gas Company; and 1872 found him serving as an Assistant-Engineer at the Windsor Street gas-works, Birmingham, while they were still under Company control. But his stay in Birmingham was of brief duration, for the following year he went to the Nine Elms works of the London Gas Company, as Assistant to Mr. Robert Morton, the Engineer, in place of Mr. Charles Hunt, who had been selected to take charge of the Birmingham works. In that capacity, Mr. Methven continued until the amalgamation of the London Company with The Gaslight and Coke Company in 1883, when, consequent on the retirement of Mr. Morton, the Directors were able to show their confidence in Mr. Methven by promoting him to the superior position. The trust which was reposed in him was not misplaced; and the Directors in 1891 gave evidence of their appreciation of his work by entrusting to him the supreme control of the huge works at Beckton, on the resignation of Mr. Frederick Beale.

Outside of his purely engineering work, the study of photometry had a great fascination for Mr. Methven; and on this subject (as many volumes of the "Journal" testify) he wrote and spoke with authority. It was in 1878 that he introduced, in a paper read before the British Association of Gas Managers, the instrument which has since been known as the "Methven screen." Both in regard to its original and improved form, this system of measuring light has been the centre of much controversy. Mr. Methven's connection with Associations identified with the profession dates from 1870, in which year he was elected a member of the British Association of Gas Managers; and he remained with it during its life under that title until 1889 under its new appellation of The Gas Institute. He did not, so far as we remember, occupy any official position in that body; but during his membership he contributed two important papers—the one already mentioned, and the second in 1882 on "Photometric Experiments with Gas of different Qualities Carburetted, and the Use of the Same as a Standard for Determining the Illuminating Power of Coal Gas." Although an able debater, his name does not frequently figure in the discussions at the meetings. On his withdrawal from the Institute, he became a member of the then newly-founded Institution of Gas Engineers, of which body he was President in 1893. Although the claims of his position at Beckton must have severely taxed his energies, he found time to take an active part, as a member, in the work of the Committee appointed by the Institution in 1896 to investigate and report upon the proposed standard of light and the relation of gas measurement to temperature. He was also a member of the Southern District Association, the chair of which he occupied in 1891. The paper which he read at the November meeting in 1889 on "Photometry" is one of the masterpieces in the records of the technical work of the Association. This paper contained a strong condemnation of the actions of the Gas Referees; and its severity induced Mr. A. G. Vernon Harcourt to attend the meeting of the Association the following February to speak in defence of himself and his colleagues. Probably Mr. Methven's last public utterances on the subject he had so much at heart were at the meeting of the Society of Arts on Jan. 29, 1896, when he took part in the discussion of Mr. Dibdin's paper on "The Standard of Light." Mr. Methven's connection with the Institution of Civil Engineers commenced in 1884; his full membership dating from 1896.

The foregoing is merely a general account of the public side of Mr. Methven's life; but of the full value of his work in connection with The Gaslight and Coke Company only those in authority can know. That it was great, and that in him his superiors had unbounded confidence, is amply demonstrated by their actions. The deceased gentleman leaves a widow, two sons, and a daughter, for whom the sincerest sympathy will be felt by a large number of friends in the gas industry. The eldest son is Assistant-Engineer at the Bow Common station of The Gaslight and Coke Company; and we may express the hope that the bright example which his father has set him will be the means of moulding at least another useful career.

The funeral took place at Abney Park Cemetery, Stoke Newington, last Thursday. On account of Good Friday, the meeting of the Board of The Gaslight and Coke Company was altered to Thursday; and in consequence none of the Directors were able to be present, and many of Mr. Methven's colleagues were prevented attending to show their respect for, and sorrow at the loss of, their old and valued comrade. The General Manager (Mr. J. W. Field) deputed Mr. J. N. Reeson to represent him; while Mr. H. Iago, the Engineer of the Fulham station, as present Chairman of the Company's Committee of Engineers, attended on behalf of the engineering staff. Among others noticed at the graveside were: Mr. J. Pearson, jun., Mr. J. H. Pearson, Mr. Gilman (Beckton), Mr. C. C. Carpenter (South Metropolitan Gas Company), Mr. Basil Ellis, and Mr. J. Morris, the Secretary and Engineer of the Jersey Gas Company, whose intimate friendship with the family extends back many years.

NOVELTIES IN PURIFYING APPARATUS.

The design of the apparatus for purifying gas, using the word in its narrower technical signification—viz., treating the gas by contact with solid reagents—appears to be the subject of some attention in the United States, as will be evident from a perusal of our notices of Gas Managers' Association meetings on the other side of the Atlantic. Some few months ago* we gave an illustrated description of a quadruplex purifying box, with mechanical devices for admitting and removing oxide, designed by Mr. F. H. Shelton; and last week (*ante*, p. 770) we noticed another contrivance for effecting the same result, designed by Mr. H. G. Beatley. Both these gentlemen appear to have been impressed by the cheapness, ease of working, and small ground-space required for treating gas with liquid reagents, as compared with the cost and area occupied by a set of dry purifiers, with their water-seals, covers, and lifting apparatus. The same thing has repeatedly attracted attention here, and led to endeavours to increase the efficiency of the liquid treatment so as to accomplish the whole of the purification by this means, and render the dry purifier unnecessary. But these gentlemen appear to have gone to work on different lines, and endeavoured to design apparatus which should secure for the dry method some of the advantages incidental to the wet—such as lower first cost, less ground area, and therefore smaller covering buildings. Mr. Beatley's design might be appropriately termed a "dry scrubber," though in a different sense to the common acceptation of that term by gas engineers.

The dry purifier, retaining substantially the original form as introduced by Reuben Phillips, still finds universal favour in England. Various details of arrangement for economizing space and labour—such as putting the boxes on the first floor, and using the ground below as a revivifying shed, or putting a revivifying floor above the purifiers—have been adopted. The assistance of conveying machinery has also been called in. Modifications in detail, like Cripps's grid-valve, have been introduced. The use of a small percentage of oxygen or air has been resorted to as a means of prolonging the life of the purifier, and thus saving labour and reducing the risk of nuisance. The washer and scrubber have been made to take a larger share of the work of purification; but the set of dry purifiers remains as the last or finishing process in the purification of coal gas. We do not wish to put forward this arrangement as perfect or incapable of improvement. The capital outlay for land, plant, and covering buildings is considerable. Where land is valuable, and masonry or ironwork is expensive, it becomes a serious matter. These conditions very rarely obtain in England; and perhaps that is one of the reasons why no special endeavours are made in the direction of cheaper or less bulky plant. A liberal outlay on purifiers is proved to be an excellent investment. It secures an ample return in the shape of economy of labour and purifying material, while it minimizes nuisance and practically guarantees a pure gas. The chief objection is the risk of nuisance. There is something crude and barbarous

* See "Journal," Vol. LXX., p. 1155.

about the idea of allowing a box full of gas to go to waste when the vessel is shut off, and a further blowing-off of gas for displacing the air when it is turned on again. There is not only the loss of gas, but its presence is recognizable in the vicinity of purifier-houses; and if the neighbourhood is closely inhabited, there is sure to be some complaint and annoyance. This applies in a less degree to the discharge of the spent material. If the washing and scrubbing plant is efficient, and the purifying area of proper proportion as compared with the make of gas, there need be no very marked nuisance in regard to the discharge, removal, or revivification of purifying material; but that of the escaping gas is unavoidable.

The question appears to turn on the number of changes that must be made in the course of a year. It is evident that the nuisance and loss of gas incidental to the present system will vary *pro ratâ* with the number of boxes shut off and emptied. If the present rate is twenty a year, and a plan of working is devised which renders ten sufficient, the nuisance is diminished by one-half. If forty changes are found to be necessary, it is doubled. These will be influenced by two causes—quantity of gas to be treated, and percentage of impurities remaining to be removed. The circumstances of working are such that variations in these respects have a much wider effect upon the number of changes than might be expected. If the make of gas is doubled, there will be considerably more than twice as many changes; and the same as regards the percentage of carbonic acid and sulphuretted hydrogen at the inlet to the purifiers. A change in the description of coal used, or method of working, which only increases these to the extent of 10 or 20 per cent., may mean twice as much trouble in the purifier-house. And if by improved washing and scrubbing one reduces them to a corresponding degree, there may be a considerable economy. It is not the quantity of gas alone, but the work to be done on it, that has to be considered in connection with any question relating to purification. Whether the proportion of sulphuretted hydrogen is 0·4 or 0·9 per cent., and the carbonic acid 1 or 3 per cent., makes all the difference in the world. The exigencies of the case are such that the gas must be purified as fast as it is made. If it were possible, by the aid of a relief holder for the storing of the foul gas or otherwise, to adjust the rate of speed through the boxes to their capacity or to the condition of the material, or to cease purifying altogether for an hour if desired, one can conceive that purification would be rendered easier. But the gas must be operated upon *en voyage* from retort to gasholder; and therefore the plant must be equal to dealing efficiently with the maximum production. The avoidance of nuisance is the chief direction in which to look for improvement on the existing system, whether by means of a continuous process in closed vessels or otherwise. As regards labour-saving machinery, this can be applied with equal facility to one system or the other. Local circumstances must determine the value of the economy in ground space and cost of buildings. So before making a radical change by introducing continuous-feeding mechanical purifiers, in place of the present intermittent method, it is well to make sure that we are doing all that is possible with the existing system. No regular rule can be laid down, because circumstances vary so widely in different places. But many engineers, by careful development of the various points above instanced, have gradually come down to a very few, perhaps not a dozen, changes per annum, of which not more than two would come in the hot summer weather, when nuisance is most likely to arise. Even under the best working, there is considerable expense attached to the filling and emptying of a purifier. Many claim to purify for nothing—which really means that they make enough profit on the sale of spent material to cover the cost of labour, and not that their labour costs nothing; so anything that will economize by saving labour will still be an advantage to them. The actual net cost of purification is not a fair guide in comparing one system with another; but we must figure on the gross cost of labour, repair and maintenance of tools, &c., as the profit from sales of spent materials would be available in any case, without regard to the system used.

There has also been a considerable advance in the direction of reducing the number of boxes employed. Three or four of comparatively large area, now take the place of a larger number of small vessels. The day of sets of six, eight, or more purifiers has passed away. We remember once visiting a gas-works boasting no less than twenty-three boxes; but this has all been altered long since. The new mechanical processes, however, go further, and claim to conduct the whole process in one vessel. Mr. Beatley says that since one condenser and one washer are held to be sufficient, so there need be only one purifier. Looking at the responsible nature of the work devolving upon a set of purifiers, we think the single-purifier notion to be a delusion. Why not carry the argument to its full extent, and have only one steam-engine, one boiler, one exhauster, and one gasholder? No one would think of not putting these in duplicate, if expected to guarantee continual service; and if this is so, what is to be said about a mechanical purifier, including machinery for delivering, spreading, and ejecting the purifying material? Machinery of all kinds must stand off at times for cleaning and repair, to say nothing of its liability to get out of order or to break down. If there is not a duplicate vessel available at a minute's notice, what is to be done should some of the internal parts ever become deranged? No gas engineer cares to have all his purifying "eggs in one basket." In the case of a set of boxes worked by a single centre-valve, there is some risk of foul gas getting straight through; and the difficulties in this direction have led to a general preference for at least a second valve, or for a catch-box. We cannot see how it would be possible to do with less than two such purifiers, with a catch-box of the ordinary type in addition, which means three boxes in all, and is getting within measurable distance of the present system, including valves, connections, and seals, if the sulphur clauses are to be respected. The claim that the days of four purifiers are numbered, seems to take too sanguine a view of the responsibilities involved in keeping up a continuous output of properly purified gas from one year's end to the other. We do not believe it would be possible to design a single vessel that would apply oxide or dry lime in such a manner as to compare on any terms of equality in respect to efficiency and reliability with the present system. The responsibility of gas engineers is very great in England. They are watched most closely; and if a single-vessel system was in use to any great extent, the fines for impure gas would be much more frequent, and instead of being exceptional would become a common occurrence. There are many companies which have existed for half a century or more, and yet have never been convicted of selling impure gas. The present system may be complicated and costly; but it has certainly proved efficacious; and therefore, looking at the issues concerned, there is a reluctance to throw it over in favour of another way of working. Its cost, if considerable, figures out to a very small proportion for each 1000 cubic feet of gas made; but in this matter the question of cost, within reasonable limits, is not the first consideration. Efficiency and reliability in action are more important.

As regards first cost, the mechanical system does not offer much prospect of economy. The mechanical parts must be strong and substantial. Finished machinery is costly as compared with rough castings; and the feeding, spreading, and ejectment devices would take a great slice out of the saving effected by any reduction in weight of iron, and in area of land covered. The machinery must be limited in respect to size and weight, which means a multiplication of moving parts. When we come to working expenses, wear and tear, &c., the case is altogether against machinery. It requires regular supervision, oiling, &c.; and there is also the cost of the power to drive it. A device comprising several moving parts that must be under regular daily attention, does not compare favourably with boxes that can be left to themselves for several months at a time. A mechanical purifier, including feed-screw above and rotating grids or rockers below, even if it avoided all loss or smell of gas, would add greatly to the responsibilities of the management. For these reasons, we think it will be a long while before gas engineers, in England or elsewhere, will think about resorting to a continuous mechanical system for dry purification as an improvement on the intermittent one. In saying this, we do not wish to discourage attempts to improve upon existing practice. We are open to conviction; and if the ingenious devices proposed by Mr. Shelton and Mr. Beatley should pass beyond the paper stage, to be constructed and put into practical operation, we should look with interest for statistics as to first cost and working expenses, in order to compare with present working.

ATMOSPHERIC GAS.

THERE was recently published the specification of an English patent in which the invention was stated to be a "Process and Apparatus for the Manufacture of Inflammable Gas, and Composition to be Used Therein." The specification is very curious reading; and as the invention has excited considerable interest in the Australian Colonies, we propose to deal with it in this column instead of in our "Register of Patents."

The inflammable gas manufactured according to the invention is intended for illuminating, heating, or motor purposes. The apparatus by which it is produced is said to comprise two essential features—viz., "a peculiarly constructed air supplier and moistener, or pump, and a generator, so arranged as to automatically (*sic*) manufacture the gas only as it is required for consumption or storage." The process consists "in impregnating atmospheric air with as much aqueous moisture as it will hold, and passing same through fine shavings saturated with a specially prepared liquid composition, contained in a small chamber or small chambers in the generator." The special composition here referred to consists of three ingredients—viz., "$(C_2H_3)_2$ O (commercial sulphuric ether), citronella oil, and water, in the approximate relative proportions of one part by weight of each of the first and seocnd ingredients to four parts by weight of water."

This composition would be a tolerably expensive product. Presumably methylated sulphuric ether would be used; and if of one of the ordinary commercial grades, and having a specific gravity of ·735 to ·750, it would cost in quantity rather more than 1s. per pound. Citronella oil in quantity costs about 2½d. per ounce, or 3s. a pound. Ignoring the small value of the water, the composition would cost about 8d. per pound, or nearly £75 per ton. Now 8d. purchases about 1 gallon of carburine, which weighs 6·8 lbs.; and therefore the composition should have, weight for weight, 6·8 times the illuminating and heating

value of carburine, if it is to form as cheap and good a medium for producing air gas. In order to estimate the prospects of the new composition as a competitor with carburine, we must therefore endeavour to obtain some idea of its illuminating value. If we find that it must inevitably be very much less than 6·8 times that of the same weight of carburine, it would be futile to proceed to test the composition in the clumsy vaporizing apparatus described in the patent specification.

Ether satisfies one essential of a material for producing air gas, in that it is readily volatile. Pure ethyl ether, the chief constituent of commercial sulphuric ether, boils at about 94·8° Fahr.; and as its vapour tension at ordinary temperatures is very high, air will carry a large amount of its vapour. This fact is at times brought home to us through the unpleasant experience of an explosion in an apartment where ether has vaporized into the air, just in the same manner as the vapour of carburine in the atmosphere of rooms gives occasion for disastrous explosions. With regard to the illuminating value of ether, there appears to be no very definite information. For the present purpose, however, the labours of the Dutch Committee on Photometry, an abstract of whose report was given in the "JOURNAL" in 1894 (Vol. LXIV, pp. 1161, 1209), will furnish sufficient data. This Committee attempted to make a standard lamp in which ether should serve as the fuel. The attempt was given up after trial, for the following among other reasons—viz., that the intensity of the light of the ether flame was too *feeble* for the purpose. In order to improve the light of the flame, the Committee proceeded to carburet the ether vapour by mixing 9 parts of benzene with 100 parts of ether; and they thus obtained a flame comparable with that of pentane in the 1-candle pentane standard lamp. The record of the work of the Committee with ether and mixtures of ether and benzene would probably serve for the computation of a fairly correct value for the illuminating power of ether flames; but we need not now find an absolute value. We know that an addition of benzene greatly increased the illuminating power of the ether flame; and thence we know that benzene is a very much better illuminant than ether. For the nonce, we will admit that ether is as good an illuminant as benzene; then, since ether forms one-sixth of the composition, and the illuminating value of benzene is very roughly six times that of carburine, the composition might, in virtue only of its content of ether, have an illuminating value about equal to that of carburine.

Besides ether, the composition contains one other constituent which may have an illuminating value. This is citronella oil—a material better known to the perfumer than to the gas maker. It consists chiefly of an aldehydic compound of the formula $C_{10}H_{18}O$, which boils at about 428° Fahr., and has therefore a very feeble vapour tension at ordinary temperatures. Without the application of heat, it would not vaporize in a stream of air at a sufficiently rapid rate to make the mixture of air and vapour inflammable. Its only possible function in the composition, when it is used in the manner described in the specification, would be to impart its odour to the air gas. The oil is combustible, like all other vegetable oils, and could probably be carbonized to a fairly rich gas; but for such a use it would obviously be unable to compete with mineral oil costing about ⅛d. per pound. We may safely conclude that citronella oil, used in the manner proposed, would not affect the illuminating power of the air gas to an appreciable extent. The water in the composition would only ensure the saturation of the air with aqueous vapour; and the presence of aqueous vapour in the air gas would injure the development of the full illuminating value of the other constituents. The net result of this consideration of the qualities of the composition is that it would necessarily have a lower illuminating value (how much lower matters not) than carburine when used for the production of air gas. But in order to compete on equal terms with carburine, we found that the composition must have 6·8 times the illuminating value of the former agent. Clearly, therefore, there cannot possibly be an opening for air gas made from the composition described in the specification.

We have purposely treated this matter seriously, and have established the worthlessness of the composition by reasonings, in place of giving an off-hand opinion based on the general knowledge of the gas engineer that it would be useless for the proposed application of it. We have done this in order to place readily at the disposal of anyone to whose attention this patent specification may be brought, a sufficient critical apparatus for resisting on irrefutable technical evidence any attempt at interesting the non-technical public in the process, on the strength of inflated statements of its commercial value. Having fulfilled this duty, we pass on to the humorous history of the short but eventful career of the invention in the Antipodes. We take our information from an Australian daily paper just to hand.

Two of the inventors—George Washington Lee and Frank Elliott—secured two rooms in a block of offices in Sydney, N.S.W. One room was ostensibly for the use of a friend who did not materialize; the other being for "The Atmospheric Gas Company, Limited," in the promotion of which the inventors had succeeded in interesting several influential men in the city. The Company was formed to exploit the invention protected under the patent to which we have already referred. The specification does not appear to have been published at the time when the Company was started; and on the ground that the disclosure of the nature of the composition used in the apparatus would interfere with the patent rights being secured, the inventors were able to preserve secrecy as to the materials of which it consisted. In the promoters' circular, the air gas was described as "A new gas made of air; decomposed air being burned." The inventors were prepared to show a house illuminated by the gas, and a gas-stove and "Otto" engine in which it was consumed. The light was described as "incandescent, clear, and white;" and the heat "is intense on the Bunsan (*sic*) burner, and the power very uniform." The cost of the gas was said to be less than 5d. per 1000 cubic feet; and the apparatus used, simple, cheap, and automatic in action. It was predicted that the air gas would "not only revolutionize the different methods of illumination, but also the production of heat and power." With reference to the nature of the gas, it was said: "The gas is produced by decomposing the air as it is consumed. It is not poisonous or explosive, and will not asphyxiate, but has rather an agreeable odour." These are a sample of the many similar bombastic predictions of the circular, which seems to have served the inventors' purpose of ensnaring the investing public.

The Company was successfully floated, and 400 shares of £10 each were eagerly subscribed for; and by judicious puffing, the value of the shares was raised to at least £70 apiece. Twelve hundred shares, taken as fully paid up, were allotted to Lee, Elliott, and a third man named Powell, in equal portions; and £3000 of the money received from the subscribers to the 400 shares was similarly divided among the three. Thus each man secured £1000, and it is alleged also made large sums by the sale of his own shares. Then both Lee and Elliot disappeared, ostensibly for the purpose of assisting in the formation of a subsidiary company in New Zealand. Mr. Garrard, one of the Trustees of the Company, and Minister for Public Instruction and Labour in Sydney, appears to have proceeded to experiment with the apparatus in the absence of the inventors; and by some means he caused a slight explosion, which laid bare the method by which he and other investors had been tricked by the inventors.

So far as we can judge from the report—evidently by a journalist ignorant of the technicalities of gas supply—of our contemporary, one of the inventors was present at all public demonstrations of the possibilities of the new gas. The inventor put the secret composition into the generator, which was then sealed by one of the Directors of the Company, in order to make sure that no fraud was perpetrated! Meantime, through a pipe or opening in the partition wall, the apparatus is now supposed to have been continuously fed with gasoline from the adjacent room, which, as we have said, was rented by an absent friend of one of the inventors. The inventors appear to have had the keys of both rooms, and of a door between the two. The fraud having been discovered, warrants were issued for the arrest of Lee and Elliott. Powell is said to have been duped by them, as was also George Tatham, a local engineer, who supplied some of the plant and took a considerable interest in the Company. The English patent is granted in the names of Lee, Elliott, and Tatham.

Our readers will doubtless smile at the ease with which men of position in Sydney were deceived by the inventors; but the laudable attempts made by our Sydney contemporary to learn why the new gas was a failure, show how instinctively the public ignores the chemist and engineer in cases of this nature. Some few cautious investors appear to have hesitated before putting money into the venture, and had the inspiration to seek expert's advice. To whom did they go? To a pharmacist! This gentleman—Mr. R. T. Bellemey, the President of the Pharmacy Board—seems to have had a fund of sound common sense, which in the matter in hand was probably of far greater service to him and his clients than was his pharmaceutical knowledge. At any rate, he sounded the inventors as to whether they would tell a professional friend in confidence the nature of the composition, in order that he might say if it was a novel discovery; and as they rejected this proposal, and the apparatus used seemed simple and crude, Mr. Bellemey advised his clients to have nothing to do with the Company. After the flight of the inventors, a reporter sought information as to the nature of the materials mentioned in the application for letters patent. He also had the brilliant idea of consulting the same pharmacist, who clearly must possess a superb local reputation as a consultant on the most diverse subjects. With regard to ether, the journalist appears to have been impressed by the formula therefor in the patent application. Mr. Bellemey was not to be outdone by a pair of fugitive inventors, so he took his pharmacopœia, and therefrom was able to tell the awed journalist that the equivalent weight of ether was 74! He also read a few other equally apposite details concerning the properties of ether, of which the most relevant was that it is soluble in ten parts of water. The readily deducible fact that the inventors' composition must therefore have lacked homogeneity, since they took one part of ether to four parts of water, appears to have quite escaped his notice. Citronella oil afforded superb scope for the display of the pharmacist's cosmopolitan knowledge; and the reporter was able to tell his readers that "it is simply a volatile oil prepared from the rind of the citron fruit." If any of those readers had looked up citronella oil in a good English dictionary, he would have learnt that it is an essential oil used in perfumery, yielded by a species of grass, *Andropogon citratum*, which is cultivated in Ceylon. The

pharmacist appears to have merely confused citronella oil with oil of citron!

With this account of the rise and fall of "The Atmospheric Gas Company, Limited," in New South Wales, we leave our readers to watch with us for possible developments in this country of the invention protected by G. W. Lee, F. Elliott, and G. Tatham, under Letters Patent No. 30,689, Dec. 28, 1897. Forewarned is forearmed.

PERSONAL.

Mr. HAROLD E. RANSOME, the General Manager of Messrs. Richmond and Co., Limited, at Warrington, and Mr. HORACE M. THORNTON, who fills a similar position at their Stratford works, have been invited to join the Board of the Company.

Mr. D. Cronk, on behalf of the outdoor employees of the Rochester Gas Company, has presented a malacca cane, beautifully mounted with silver, to Mr. WALTER HOLE, as a mark of their esteem, and with their best wishes for his success in his new work at Leeds.

At the monthly ballot for membership of the Institution of Civil Engineers on Tuesday last, the following were admitted as associate members: Mr. C. E. BRACKENBURY, Gas-Works, Milan; Mr. S. BRYAN DONKIN, of Messrs. Bryan Donkin and Co., Limited; Mr. A. G. GLASGOW, of Messrs. Humphreys and Glasgow; Mr. H. C. HEAD, Bournemouth Gas-Works; and Mr. F. ROBERTS, the Borough and Water Engineer of Worthing.

The Estimation of Carbon Monoxide Diluted with Air.—M. Armand Gautier has submitted to the Paris Academy of Sciences some remarks on the use of iodic anhydride for the estimation of minute quantities of carbonic oxide (1 in 20,000). The reaction is complete at 60°; the iodine being collected upon a roll of reduced copper and weighed. Better results are obtained by determining the carbon dioxide produced. Acetylene also reacts with iodic anhydride; and ethylene, though not reacting itself at 60°, possesses the peculiar property of completely preventing the oxidation of carbon monoxide.

Bye-Product Coke-Ovens in Alabama.—The number of coke-ovens in Alabama is shortly to be increased in consequence of a contract having been made for supplying the city of Birmingham with gas for illuminating and fuel purposes. It is proposed to obtain the gas from a large block of bye-product coke-ovens of the Otto-Hoffmann type, and they will replace the beehive ovens now in use. It appears that there are special facilities for employing the gas for city supply. The coke will be used by the blast-furnaces close to the ovens; and the whole plant will be placed where the minimum amount of piping will be needed.

Gas-Engines for Driving Dynamos.—The "Engineering Record" recently gave the results of some trials of a Nash gas-engine of 20-horse power, directly connected to a Ricker dynamo, carried out at the Stevens Institute. The engine was of the vertical two-cylinder type. It was found that with gas of a calorific power of 701·3 British thermal units per cubic foot, 17·6 cubic feet were required per brake horse power per hour. The gas per kilowatt hour at full load was 30·8 cubic feet. The friction of the engine and dynamo was 13·8 per cent. The gas required to drive the engine and dynamo without a load was 95·2 cubic feet per hour. The efficiencies of the engine and dynamo were 20·6 and 83·1 per cent. respectively. The amount of light given by electric lamps which had been in use some time was found to be 1·69 times as great as the gas used to drive the engine would have given if consumed directly in the burners. The test showed that 16-candle lights could have been run at an operating expense of less than 0·25c. per lamp-hour when using gas at $1·25 per 1000 cubic feet.

Projected Exhibition of Acetylene Gas Apparatus at the Imperial Institute.—The Orders in Council regulating the use of calcium carbide and of acetylene gas when the gas is under high pressures or liquefied, do not legislate for apparatus in which gas is generated from the carbide at low initial pressure, and of these there is now a great variety before the public. While the majority may be absolutely safe with ordinary precautions, some of them may, from want of adequate scientific knowledge of the properties of calcium carbide and of acetylene gas, be so constructed as to constitute a very serious danger in the hands of unskilled labour; and it is chiefly where such labour is employed that the new illuminant now meets with the largest demand. The Council of the Imperial Institute have authorized the holding of an Exhibition of Acetylene Gas Apparatus in the grounds of the Institute at an early date; and in order to ensure that no appliance is admitted unless it is shown to fulfil the requisite conditions of safety, the Council of the Society of Arts have appointed a Committee to decide upon those conditions, and to lay down rules for the admission of apparatus. The following gentlemen have been appointed members of the Committee: Major-General Sir Owen Tudor Burne, G.C.I.E., K.C.S.I. (Chairman of the Council); Sir Frederick Bramwell, Bart., D.C.L., F.R.S.; Professor James Dewar, M.A., F.R.S.; Mr. H. E. Jones, M.Inst.C.E.; Professor Vivian B. Lewes, F.I.C., F.C.S.; Professor Boverton Redwood; Professor W. C. Roberts-Austen, C.B., F.R.S.; Professor J. M. Thomson, F.R.S.; and Sir Henry Trueman Wood (Secretary). Full particulars will shortly be issued as to the regulations and rules laid down.

TECHNICAL RECORD.

SOCIETE TECHNIQUE DU GAZ EN FRANCE.

The Annual Congress at Nice.

The programme of the forthcoming congress of the above-named Society, which, as already notified in the "JOURNAL," will take place at Nice on the 20th inst. and following days, under the presidency of M. Ph. Delahaye, is given in the current number of the "Journal des Usines à Gaz." The following subjects will be brought under the notice of the members: "The Removal of Carbon from Retorts," by M. Bachelay; "Charging and Drawing Retorts by the De Brouwer Double-Action Conveyor," by M. Rouget; "Increasing the Yield of Ammonia in Gas-Works," by M. Brunet; "Prevention of Frauds due to Tampering with Meters," by M. Lacaze; "The Working of Prepayment Meters at Nîmes," by M. Desmazes; "Automatic Tap for Converting Ordinary into Prepayment Meters," by M. Dupoy; "Diffused Lighting from the Ceiling," and "Comparison of the Usual Systems of Lighting," by M. Bouvier; "Recent Progress in Lighting Incandescent Burners from a Distance," by M. Syssoyeff; and "Gazo-Electric Lighter for Incandescent Burners in Public Lamps," by M. Léon Soubiran. The subject of acetylene will be dealt with by M. Bouvier, who will refer to certain accidents resulting from its use in a pure state; and also by M. Monniot. A visit will be paid in brakes to Monte Carlo, where the gas and electric light works will be inspected. The route will be by the famous Cornice road, calling at the Montgros observatory; and facility will be afforded for a drive round Cap Martin.

INFORMAL MEETING OF SCOTCH GAS MANAGERS.

Meeting in Glasgow.

The Fifteenth Annual Informal Meeting of Scotch Gas Managers was held in the North British Station Hotel, Glasgow, on Wednesday last. Mr. HUBERT POOLEY, of Dunfermline, presided. There was a large attendance of Managers and friends, among whom were the President (Mr. Thomas Wilson, of Coatbridge) and office-bearers of the North British Association of Gas Managers, and the Secretary (Mr. W. B. M'Lusky, of Selkirk) of the Waverley Association of Gas Managers.

CHAIRMAN'S ADDRESS.

The CHAIRMAN, in his opening address, said: It was my extreme misfortune to be absent from the annual gathering last year, when you voted me into the chair for the present meeting; and I am exceedingly sorry that my thanks to you should be so late in the day as this. But I must now take the opportunity of thanking you sincerely for the honour you have done me.

These annual gatherings have been kept up more with a view to social intercourse, and to the discussion of current topics of interest, than as providing a means of listening to papers or other communications from members; and it has been a very wise plan for the Chairman on these occasions to introduce a few subjects for the meeting to discuss.

The newer methods for obtaining illuminating gas from coal or other material seem, this year, to have received a considerable share of notice. Many new carburetted water gas installations have been introduced, and inclined retorts are looked upon with increased favour. About six years ago, Mr. Stelfox introduced water-gas plant at Belfast; and about a year later we were shown the first carburetted water-gas plant north of the Tweed, when we visited the Dawsholm works of the Glasgow Corporation. And now we have in Great Britain installations capable of producing over 69 million cubic feet of water gas per diem, either actually at work or nearing completion.

A few weeks since a very lucid description of the most modern type of sloping retort plant was read before a Birmingham Engineering Society, and many of us will have read it with interest.* I had an experience of M. Coze's first system of "slopers" when I was serving my articles; but since those days very great improvements have been introduced, and I think I am correct in stating that to-day, for economy of production, they stand unrivalled.

When I first came North, I was very much surprised to find that the tar and ammoniacal liquor were usually sold together, either per 100 gallons or per ton of the mixture, the liquor being of a fixed minimum strength, as estimated by a Twaddel hydrometer. I think a far more equitable method of transacting business would be to sell the two residuals separately, estimating the percentage strength of the ammonia in the latter by means of distillation tests, and selling on a sliding-scale, according as the sulphate market fluctuates month by month. There would then be a definite basis to work on, instead of the specific gravity tests, which, as everyone knows, are very misleading. But, probably, with a fair prospect of the sulphate market keeping at a passably remunerative figure, more of us will be tempted to go in for its manufacture; and if we are, I hope we shall all remember to whose endeavours the present enhanced values are mainly

*See "JOURNAL" for March 15 and 22, pp. 588, 647.

due, and join the ranks of those who are endeavouring to bring the value of sulphate more prominently forward. In this way, and, I think, in this way alone, can the prices be kept up, and perhaps improved.

We have not heard very much about acetylene lately; and what little we have heard, as a competitor with coal gas, seems to have come exclusively from the Continent, where, I understand, a few small towns have taken up this means of obtaining artificial light. My own experience with acetylene has not been very great. I have made a few experiments with the view of estimating its value as an enricher; and the best results I obtained placed it at about four times the value of our richest cannels. This would mean that, before we could use it profitably, we should only be able to give from £3 to £3 10s. per ton for the carbide. Of course, I am speaking now of Dunfermline, where we are well situated for obtaining cheaply some of the richest cannels. My own best results have been obtained in a cycle lamp; and for this purpose the light is very powerful. Indeed, it is almost too bright for the comfort of those in charge of approaching vehicles, or of pedestrians. I must say I think too much looseness is observed in the selling of calcium carbide, practically to anybody, notwithstanding the regulations imposed by the Board of Trade. In Mr. Hastings's valuable annual for the current year we find a very good summary of the views of a conference of German chemists, held in Berlin about twelve months ago, on the chief reasons for danger in the production and use of acetylene. The opinions then expressed seem to point out as the three principal reasons: (1) Generation under too high a pressure; (2) the formation of copper acetylide; and (3) the use of acetylene containing hydrogen phosphides or hydrogen sulphides, as impurities. We find that very stringent regulations have been enforced in Berlin and Paris, and other places, both regarding the production of acetylene and the transport of liquid acetylene.

I have managed to procure a sample of an old horizontal-dial meter, which has been in use in my town for the past 60 years. The meter has been working just as correctly as any of the modern meters, and has given us, practically, no trouble. There is a very great difference in its appearance to that of the modern wet meter. I have not, as yet, seen any more of the "Positive" meter than a diagram; but the principle of it seems to be a very excellent one, and the meter should combine all the advantages of the dry, with the durability and greater accuracy of the wet meter.

We shall all hail with welcome the advent of a new and much improved incandescent gas-burner, of which we have heard some rumours within the last fortnight. Indeed, intimation has now been given by the Welsbach Incandescent Company that the burners are to be placed on the market in June. We have had two great improvements in the methods of applying illuminating gas; and now we are promised an advance which is certainly as far ahead of the present incandescent burner as it was ahead of the regenerative lamp, or than the regenerative lamp was ahead of the ordinary flat-flame burner. With an efficiency of 34 candles, or thereabouts, per cubic foot (presumably with London 16-candle power gas) the question will soon surely have to be faced, "Is it value to manufacture high-grade gas?" Let us hope that the mantles for the new burner will prove more durable than those now in use. There is still much room for improvement in this direction.

If we would follow the example given elsewhere, of describing some of our worst experiences, or the greatest difficulties we have overcome, it would prove interesting to all; and I am sure that some of us who are the younger members of the profession, and of the Associations, would benefit very much by the experiences of our older brothers in arms. The most trying season I ever went through was spent in the old works of the Dunfermline Gas Company. We had plenty of retort-power—78 retorts 8 ft. 6 in. by 15 by 13 inches; and we were producing something like 400,000 cubic feet of gas per diem. Our condensers, too, were quite sufficient; and we had a 500,000 cubic feet per diem Walker's purifying machine. We had two exhausters—one very small, and the other a nominal 40,000 cubic feet per hour one, of an antiquated pattern. In order to pass the largest quantity of gas we were making then, we had to drive our engine at about 200 revolutions per minute; and the noise in the house was simply deafening. However, the exhauster held out well until I had done with it. Our greatest difficulty of all lay in the purifying-house, where we had only four purifiers, each 12 feet by 8 feet. The result of this was that we could not purify our gas thoroughly; and for three or four weeks in the depth of that winter we changed our purifiers at the rate of eight per week. Gasholders, excepting one at the new works, which was then in use, were giving me a great deal of anxiety. I had two which each held 30,000 cubic feet, and one which held 125,000 cubic feet; and I had to keep men constantly employed watching the holders, and patching them as best they could, until we had everything ready for gas making at the new works. The outer shell of the largest holder completely gave out, and narrowly escaped dropping off, when the holder was well up; and on one occasion the man who was patching one of the smaller ones put his thumb right through the shell.

A word might here be said with regard to "gassing." I have three times experienced serious cases of "gassing" among employees; and each time artificial respiration was resorted to successfully. I should much like to hear the experiences of some who have tried the use of oxygen on similar occasions.

I have purposely curtailed my address as far as possible, and trust I have not wearied you by touching on subjects which are nearly all old, but which should be evergreen to all of us. I hope we may have a good talk on some of them—at any rate a good and useful discussion on the difficulties of purification (say, from the retort to the station-meter) should prove interesting, and perhaps would be the most profitable of all the headings touched on.

Discussion.

Mr. W. Smith (Ayr) said they had all listened with the greatest pleasure to the Chairman's address. There were some points upon which he would like to say something. There was certainly great prejudice against water gas, on account of its poisonous nature. They might say that only a certain proportion of water gas was being used; but still that did not remove the prejudice people had against it. In Ayr, he had been repeatedly told by two or three men who had, all through their lives, been engaged in business in Glasgow, and who were now retired and living in Ayr, that if he introduced water gas into the town, they would immediately cut off their gas supply. They could not meet a statement of this kind by saying that there was only a certain proportion of water gas. He thought that as long as they could make coal gas as economically as they were doing at present, which was in some cases cheaper than water gas, they should leave water gas alone. It was right enough in large works to separate the tar and liquor, and to sell them separately; but in small works it would more than duplicate part of their plant, and lead to expense and trouble. When they could sell the two together at a certain price, he thought it simplified matters very much. Until he could see the advisability of separating them, he would continue to do as he was doing, and sell at so much per 100 gallons. He did not know what the advantage was in separating them at the works, rather than selling to tar distillers. Acetylene gas certainly gave a very nice light to look at; but when they considered that whenever calcium carbide came into contact with water, it became dangerous, they began to think that it was too fine a substance for constant use. It could not stand the "rough and tumble" of every-day work. As far as they had experience, it was very dangerous. He had had two or three experiences of "gassing." Artificial respiration was very good; but the best remedy he had got for "gassing" was a stiff glass of whisky.

Mr. T. Wilson (Coatbridge) was sure they were all indebted to Mr. Pooley for his valuable paper. He had given them much good matter for discussion. He had been making inquiries for a number of years as to water gas; and he found that it could not compete in a mining district with coal gas. It could not be produced so cheaply, of the same quality; but it suited some towns. There were none of them but would be willing to adopt water gas if they found it as economical to produce as coal gas. It suited Glasgow or Edinburgh, where a sudden demand for gas came on, and a large volume was required; but he did not think it would suit the smaller towns. It was of little moment to them whether they sold their tar and liquor combined or separate—it was a matter of money only. It was for the gas manager to say which was best. If he found it more profitable to sell them combined, he should do it. They had a good example in Mr. Ewing, who sold them combined; and he would like to hear his experience in the matter.

Mr. W. Ewing (Hamilton) said that the highest return he ever got for residuals, including coke, was 6s. 8½d. per ton of coal carbonized; but he could not get that now. At the present time he was selling tar and liquor at 3s. per 100 gallons, which would make the return for coke, tar, and liquor about 3s. 6½d. per ton of coal. He supposed that in most works it was better to utilize the tar and liquor, so far as they could, in making sulphate of ammonia. They anticipated going in for sulphate plant, on account of the great trouble they had had, in the storage of tar and liquor. He had been speaking to Mr. Carlow that morning about his plant; and to all appearances, he thought it would be better, considering the low prices prevailing at the present time, for each gas manager to go in for the manufacture of sulphate, and sell the tar either in the green state or in the shape of pitch. He had never had, in all his experience, a single case of "gassing" among his workmen; but one of their councillors had been reading recently in connection with an accident in England, and brought the matter before the Town Council. The conclusion come to there was that it would be a safe thing to have a cylinder of oxygen kept at the gas-works, to be used in cases of "gassing." Fortunately, he had never had occasion to use anything of the kind.

Mr. Wilson said that at Coatbridge he got something like 4s. 3d. per ton of coal for his residuals—coke included. He thought that in a works manufacturing as much as 50 million cubic feet of gas per annum, it was expedient that they should work up their tar and liquor.

Mr. R. S. Carlow (Arbroath) said that when he went North he found he had the greatest difficulty in getting the residual products disposed of; it did not matter whether the tar and liquor were combined or separated. They sold both ways. He began to consider the matter, and succeeded in demonstrating that they would do far better to manufacture the residual products themselves. He would give them some figures. In the

month of February last they sold a considerable quantity of sulphate at £9 10s. per ton. That would produce a very good revenue this year. They also sold, in the month of February, naphtha at 11d. per gallon. After taking out the naphtha, they sold the boiled tar at 1s. 1¼d. per gallon. He got for the boiled tar as much as he would have got for the whole of the unmanufactured products; and he had all the rest as profit. This showed that Mr. Wilson was very safe in making the statement that he would advise gas companies and corporations who had an output of 50 millions to work up their residuals. He would go down further, and say that those with an output of only 20 millions should do so. They would make—although he did not want to put a figure upon it—at least 5 per cent. more than they would by selling the residuals, he did not care whether mixed or separated. The first case of "gassing" he saw was when he was a boy in Linlithgow. A workman was making a joint upon a 4-inch main; and the gas got so much the better of him that he became unconscious. His (Mr. Carlow's) father administered to him a glass of whisky in a bottle of ginger beer. It relieved him; and the man came to himself at once.

Mr. A. Waddell (Broughty Ferry) said that in his last place he worked up sulphate of ammonia, and found it very profitable. He gained something like 1s. per ton of coal carbonized. He had lately been thinking it would be advisable for them to do the same in Broughty Ferry. Just a little caution might, in the meantime, be exercised. He had very little doubt about the advantage of taking the naphtha out of the tar; but he would be very pleased to hear what were the experiences of those who did it, as he was afraid the trouble might be so great that it would be hardly worth the doing. However, from inquiries he had made, he found the opinion to be certainly in favour of making sulphate of ammonia. Mr. Pooley had mentioned sloping retorts. Not many of them, he supposed, had had experience with them; but they were all anxious to learn what were the facts of the case, for and against them.

Mr. J. W. Carmichael (Barrhead) was sure Mr. Pooley had given them many subjects to think upon; and some of them such as those who were in smaller works might not very well entertain—water gas or inclined retorts. Water gas was all a matter of price; and the time might come when they would have to consider it. He thought it was the right thing to have good-sized purifiers. Last year he put in a set, 14 feet square; and his mind had been at ease ever since. He did not know how they would have got through their work during the past winter except for them. He had had two or three cases of "gassing," and he had always tried brandy as a cure. He saw Mr. O'Connor, in a paper he recently read, advised milk; and there might be something in that.

Mr. A. Wilson (Dawsholm) said they had had a little experience in Glasgow with water gas, but had discontinued it in the meantime, as they found that they could make good coal gas rather cheaper. But still water gas had many advantages to recommend it which other systems did not have. It was easily and quickly made; and certainly one great point about it was that it used up a good deal of surplus coke, for which it was sometimes difficult to find a market. He thought the poisonousness of water gas was merely a question of degree, and did not enter into the question of the supply of the gas where it was profitable. The carbonic oxide was only increased by a very small percentage. If one turned on a burner of the gas at night, and left it on, he did not think it would matter very much in the morning whether the gas had contained a percentage of water gas or had been coal gas alone. The accidents which had happened in districts where water gas was supplied he did not think had ever been traced to water gas. They had not had very much experience in the North with sloping retorts; but it appeared to him that, with their charging machinery, they could hold their own with sloping retorts. In some places where they had machinery and slopers together, it was a "toss-up" which was best. It might be supposed that inclined retorts would give better returns; but, so far, they did not seem to do so, else they would not have so many companies and corporations going in for machinery. If slopers were so economical, they would go in for them instead. He could say very little about tar and liquor. At Glasgow, they sold them together at so much per ton, according to the market. They had quite enough to do in making gas to go in for the working up of their residuals. Where gas managers could afford to give their attention to the working up of tar and liquor, they would save the expenses of a tar-works, and would gain a little in this way. Since he came North he had not had any experience in the "gassing" of workmen. In the South they had many cases; and they found that lemonade, or ginger beer, or milk, was preferable to either whisky or brandy, as a cure.

Mr. T. Wilson, referring to Mr. Waddell's request for experience in the working of residuals, said he had gone into the figures pretty minutely; and he found that, supposing everything were favourable, for naphtha, and pitch oil, and pitch, they would have a gain of 3d. per ton of coal carbonized.

Mr. T. Lighbody (Renfrew) asked what was the actual return per ton of coal for sulphate of ammonia, and distilling the tar and liquor, exclusive of coke. What he wanted to know was whether it would be more profitable to sell or manufacture into sulphate.

Mr. T. Wilson said that in Coatbridge they had a yield of 6½d. per 1000 cubic feet of gas, or about 4s. 2d. per ton of coal, including coke. Unfortunately, he used a very cheap class of coal. The output was something like 8000 cubic feet per ton; and the average cost was 7s. 3d. He, however, never got less than 4s. or 4s. 3d. per ton for residuals, including coke. He found that they had as much profit in the manufacture of sulphate as they had from the tar. That was 3d.; and if they added the other 3d., that made 6d. which they would have instead of selling "green." Of course, circumstances altered cases; if they were near a tar distiller, they could command a better price. The figures he had given they were to take as relating to Coatbridge alone, and not to any other town.

Mr. Carlow said that, so far as he was concerned, if he were selling his raw material, either mixed or separated, he would be getting, at present, from £370 to £400 a year from tar distillers. On the other hand, he was manufacturing and selling naphtha, boiled tar, and sulphate of ammonia; and he was getting—after paying all expenses, capital, wages, and everything—more than £1000. He had thus a profit of £600 or £700 on an output of 60 million cubic feet of gas.

Mr. W. B. M'Lusky (Selkirk) said that when he was in Kelso, with a make of 13 millions, he received from £180 to £190 for tar and liquor alone. They carbonized about 1400 tons of coal. As to sulphate, they were situated so far from the tar distillers that the question of carriage entered into their contract. He believed that in a district like that around Kelso it would be very profitable if one gas-works were to start a plant for working up residuals and the others were to send in their raw material to it. But he did not at all see that in a place like Selkirk it would be profitable to attempt to compete with the distiller. With regard to water gas, he might draw the attention of those present to the remarks which Mr. Foulis made to an interviewer not long ago. He said that water gas was useless in a fog, because the fog would often be away before the water-gas plant could be set in operation. It appeared that water-gas plant could not be got into operation in two or three hours, as appeared in advertisements; and Mr. Foulis stated that it would be better to have resort to holders of larger size, and then a stock of gas would always be at hand. Another point with regard to water gas was that the carbon monoxide in it acted so rapidly on the blood.

Mr. Forbes Waddell (Forfar) said there was one thing he was not satisfied with. He got for tar and liquor, per ton of coal, 2s. 3d. from the tar distiller. They were thinking of erecting sulphate plant; but the question was whether, considering the price they were at present receiving, it would pay them. He had not gathered from the replies whether it would really be profitable or not. He would like those who were working residuals to give their figures as to the quantity of sulphate they obtained per ton, leaving out the coke. As to purifiers (he might say that they used a good deal of shale), he put in a set of three, 18 feet square by 6 feet deep. They had a make of over 30 million cubic feet. They changed one purifier in the middle of December last, and they had not changed any others till the previous day. They used oxide in one box; and it stayed, as a rule, about a year in the purifier.

Mr. P. B. Watson (Falkirk) asked if Mr. Waddell found any difference in the illuminating power of the gas, from the same class of coal, when using oxide, from what he did when he was using lime.

Mr. Waddell replied that he took the precaution to analyze the gas, in a simple way, with a Bunte's burette, to ascertain whether or not there was any carbonic acid passing through the lime. They would not expect to get any difference in the illuminating power unless they removed all the carbonic acid. The gas was passed first through one lime purifier. In this way they got the lime fouled; and the purifier was kept on for about a fortnight. Then he changed, and put the gas through the oxide first. He always had a lime purifier last. The gas was tested by a public tester; and it did not vary very much—from one to two candles as a rule.

Mr. W. Mackie (Port Glasgow) asked if he understood Mr. Waddell to say that he used a lime purifier after his purifying was finished with oxide.

Mr. Waddell said the second and third purifiers were charged with lime. He could work through 3, 1, 2, or 2, 3, 1, or 1, 2, 3; but as a rule it was 1, 2, 3. When they were changing, it was a matter of putting off, say, No. 3, and working Nos. 1 and 2. They changed whenever they got carbonic acid passing the clean lime. Last year, over all, lime and oxide cost £35 for a make of 33¼ million cubic feet of gas. They had their oxide on the hire system.

Mr. T. Wilson pointed out that after eight days the lime in the last purifier would exist as carbonate of lime, and would have no affinity for carbonic acid.

Mr. Waddell said that when the gas went through the oxide at first it did not commence to purify the gas efficiently at all. He had a great deal of trouble with this matter last year. When he put on the lime purifier first he did not wait till it became fouled, but till it got heated up a little; and it certainly did its work a great deal better. After that he did not believe in passing the sulphur forward into the lime; and it took it all out in the oxide purifier—leaving the lime to take out the carbonic acid. If all the boxes were filled with lime, and all clean, he would expect to get sulphur passing the purifiers more readily than if one of them had been in action about a fortnight. Their make was at the rate of about 8000 cubic feet of gas per hour.

Mr. T. Wilson thought that Mr. Waddell was to be complimented on his results, whether it was due to his working oxide in conjunction with lime, or the coal he was using. But his cost was certainly very low. His material only cost him ¼d. per 1000 cubic feet of gas sold. At Coatbridge, it cost ½d. per 1000 cubic feet. He did not use oxide at Coatbridge. He found that it fired by spontaneous combustion; and they had several times had an explosion. At Coatbridge, they used something like 33 per cent. of shale; and they all knew that gas from shale was much worse to purify than gas from ordinary coal. However, he found that some splints were as bad to purify as shale.

Mr. Waddell said that at times he used about 30 per cent. of Fife shale.

Mr. T. Wilson remarked that his experience with Fife shale was that it was not so bad to purify as some others.

Mr. Mackie said he never had any explosion with oxide; and if he had room in his works to store both lime and oxide, he would use them both.

Mr. D. M. Nelson (Glasgow) did not think that any explosion would take place with oxide without his knowing it; and he would like facts on the subject.

Mr. T. Wilson replied that he had not only had explosions in oxide boxes, but had seen lime grids fired.

Mr. Carlow said he had tried both substances, and in all ways possible—the lime before the oxide, the oxide before the lime; and he said this—that, in the use of oxide, the "game was not worth the candle." In lime they had an agent on which they could depend; it took out both the carbonic acid and the sulphuretted hydrogen thoroughly. Whatever gain they might have in cost by using oxide, they lost in illuminating power, on account of carbonic acid. With lime they could use cheaper coal, and still keep up the illuminating power.

Mr. J. M'Gilchrist (Dumbarton) agreed with Mr. T. Wilson that Mr. Waddell must be complimented on the wonderful results he had obtained in regard to the cost of purification. The subject which had taken up the largest amount of discussion was with reference to residual products; and while the general opinion had been that to manufacture sulphate from the liquor, and perhaps naphtha from the tar, there could be a good word said for the old-fashioned method, which had been carried on in Scotland for a long time, of selling the tar and liquor at a price per 100 gallons. Perhaps as Mr. Wilson, of Dawsholm, had remarked, a price per ton of coal carbonized might be a simpler way. If, with all the skill of the esteemed President of the North British Association, only 6d. of profit per ton of coal carbonized could be produced in the working up of residuals, on a yield of 8000 cubic feet per ton, the return was less than 1d. per 1000 cubic feet. Managers of gas-works had a hundred-and-one duties to perform. If there were added the scientific knowledge which was required for the production of these products economically, he was afraid something else would be going to waste. It was not wise, at the present time, to add to the gas managers' duties. These were well defined; and if they were attended to, he believed it would be more in the interests of gas consumers than would be the introduction of the new business of manufacturing sulphate, especially in small works. They must remember, in taking the figures adduced by Mr. Wilson and Mr. Carlow, that the latter gentleman lived far from tar distillers, and possibly the price he received for his tar and liquor showed badly as against what was got by managers who were nearer. Tar distillers would be wise to give a fair price for tar and liquor, otherwise they would be having all the owners of gas-works introducing this new plant. In Glasgow, where there was a large manufacture of gas, they saw that they could do better by selling their tar and liquor than by working them up. Notwithstanding anything that had been said in the discussion, he would not change from the old method of selling per 100 gallons at the highest price he could secure. Most of the gas-works he was acquainted with were small; and if this new process were added, the plant would occupy space which might be utilized in a better way, in connection with gas manufacture. He was very pleased to hold to the good old plan.

Mr. Carlow: If I had got a good price, I would have held to it too.

Mr. M'Gilchrist said, with regard to water gas, he thought that to most of those present at the meeting it was not a question which was within the region of practical politics. Until they could make water gas very much cheaper than coal gas, it would, with all the risks attending it, be unwise to adopt it. He had had a great many workpeople gassed. He could tell them that fashionable doctors in the West-end of Glasgow, when called to men who were gassed, knew nothing about what to do; and he had had to assist them. He should say ginger beer would be better than either whisky or brandy as a cure. Possibly, in Scotland, they were not ripe for inclined retorts. In England, where they used stuff like dross, perhaps the angle of repose was easier found than it would be were they charged with cannel coal. He was afraid that the round cannel would have an inclination to move to the bottom mouthpiece, and possibly the gas would not be very well taken off. In any case, they had not had any experience in Scotland with inclined retorts; and they could say little about them. He saw one or two meter manufacturers present, and he would be glad if they could explain how it was that the old meter before them had stood the test of 60 years' working, and was as good to-day as ever. They had changed the system of manufacturing meters without producing any improvement.

Mr. A. Yuill (Alloa) thought they would all admit that the meeting had gone off satisfactorily. Some of them would remember that, in the address he delivered two years ago, he took up the subject of carburetted water gas, and gave some figures which, to his mind, proved conclusively that water gas could not be manufactured so cheaply as coal gas. They had still this fact to bear with; and the poisonous nature of the gas remained, no matter what might be said about the cost. In his opinion, some of the speakers had been rather hard on tar distillers. He himself manufactured sulphate of ammonia. While admitting that they made a profit by it, they must on the other side of the account put the trouble and inconvenience it sometimes gave; and for a small gas-works, he, like Mr. M'Gilchrist, would not recommend anyone to put down sulphate plant. Acetylene was a subject which he thought they were all conversant with. He recently noticed an account of a party who had been in the habit of using acetylene gas, in whose hands a tin of carbide of calcium exploded when he was opening it. It appeared that the carbide, even in a sealed tin, had gathered a little moisture, and the man opened the tin with a red-hot iron. No wonder there was an explosion. There was, therefore, he thought, a good deal of danger in the use of acetylene gas. He understood that the fire insurance companies placed a very high premium on buildings where acetylene light was used. They required, too, that the generator should be placed at least 30 yards from the building which was to be lighted. This also militated against it. High-grade gas was a subject which was often before them. Time was a mighty changer; and there was no doubt that as gas became more extensively used for other purposes than lighting, it might become more advantageous for them to manufacture a gas which would be better adapted to these purposes, though it might be less suited for lighting than high-grade gas. The new incandescent gas-burners were wonderful; but he should like to know if they were likely to get a mantle which would be less fragile than those now in use. He understood that with the new burners the Welsbach Company had been able to raise the illuminating power to more than 30 candles per cubic foot; and so this was a factor which was likely to compete with the electric light. This was a matter in which all were interested. They had all experienced difficulties in purification. No matter whether their works were large or small, they had found themselves caught at times when they least expected it. Some of them might have noticed that the purifiers showed a foul test—just a very little—and that they were somewhat hot. This, of course, pointed a lesson. The lime must have been put into the purifiers too hot, or perhaps it might not have been sufficiently slaked, and the gas, in passing through it, deposited a little moisture, which raised the temperature of the lime. He had also seen purifiers giving a foul test when the lime was quite cold and the gas at a lower temperature than when it entered. He had got over this difficulty by putting in the lime thoroughly slaked, with a little heat in the gas to impart a higher temperature to the lime. He once had a man gassed, at some distance from the town, and they laid him down with his face to the earth. It was wonderful to see the power the earth had in drawing the gas out of the body. He was glad, personally, from the position he occupied, that the meeting had proved so successful; and he hoped this would be their experience in the future.

The Chairman thanked the meeting for their assistance in threshing out the points raised. He would have liked to hear more said regarding purification and the heating of purifiers, as mentioned by Mr. Yuill. Acetylene had hardly been spoken of; but it was almost a stranger among them yet.

Mr. Yuill proposed Mr. W. Ewing, of Hamilton, as Chairman of the meeting next year.

Mr. M'Gilchrist seconded the proposition.

Mr. Ewing agreed to act, and returned thanks for the honour conferred upon him.

Mr. Yuill was re-elected Convener of next year's meeting.

A vote of thanks to the Chairman closed the proceedings.

The company, to the number of over seventy, afterwards dined together in the hotel—Mr. Pooley presiding. The toast of "Kindred Associations" was proposed by Mr. A. Wilson, and responded to by Mr. T. Wilson, on behalf of the North British Association, and by Mr. W. B. M'Lusky, on behalf of the Waverley Association.

Local Authorities and the Clacton-on-Sea Gas and Water Bill.—At a recent meeting of the Tendring District Council, a letter was read from Mr. A. K. Chamberlayne, the Clerk to the Clacton District Council, stating that, as a result of the conference held with the Solicitors and Parliamentary Agents of the Clacton-on-Sea Gas and Water Company, an agreement had been practically settled under which the Council would purchase the undertaking of the Company. The clause in the agreement affecting the Tendring District Council was that which will give the Clacton Council the right to call upon the Company to proceed with their Bill so far as it empowers them to obtain supplies of water from the parish of Great Bentley, and to lay conduits for bringing it into Clacton; but it was not intended that the limits of supply should be extended to Great Bentley. The Clacton Council, however, would agree to a clause being inserted in the Bill, obliging them to supply any district from which the water might be taken in bulk. It was decided to adhere to the Council's original claim for the water to be supplied to that part of their district from which it might be taken if required.

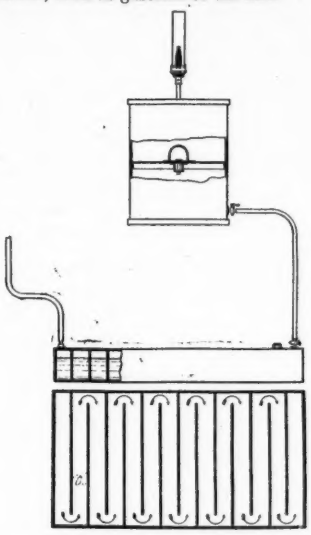
REGISTER OF PATENTS.

Protecting and Sustaining Incandescent Mantles.—Rushing, C. O., of Sheffield. No. 9045; April 9, 1897.

The patentee proposes to fix a cone or dome (or more correctly the frustum of a cone or dome) of finely-woven wire, or other perforated material, in the gallery which usually holds the glass chimney of an incandescent burner; so as to separate the air supply into minute streams, and prevent "sudden inrushes of air from any direction." When the mantle is on the lamp, the lower edge comes in contact with the guard just below the hood, and thus is "prevented from vibrating or having a pendulous movement from the suspender which tends to destroy its lower edge, and occasionally causes its collapse."

Manufacture of Gas.—Poppel, A. H., of Hamburg. No. 25,866; Nov. 6, 1897.

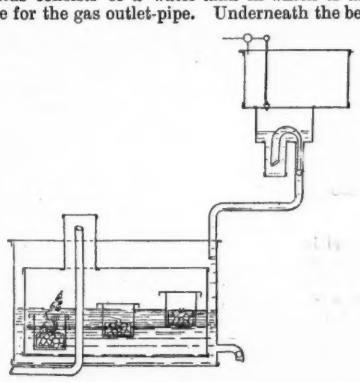
The patentee says that his invention relates to "an apparatus for generating gas by a 'cold process,' by which only just so much gas is generated as is required for a determined consumption for illuminating, cooking, or heating purposes. The generation of the gas is effected by means of a peculiarly constructed carburetter, which is partly filled with a suitable hydrocarbon, such as gasoline or the like."



The illustration accompanying the specification is reproduced; and it will be sufficient to state that the claims advanced for the invention are: (1) Apparatus for generating gas by a cold process, in which the illuminating gas produced by forcing air into a carburetter partly filled with gasoline is caused, before it reaches the place of consumption, to pass through a bipartite gasholder for the purpose of regulating the generation of gas in accordance with the consumption. (2) A gasholder divided by a partition into two chambers, into the lower of which the gas collects until a certain pressure is reached, and then passes a check-valve (which is covered over by a net or strainer) into the upper chamber, which takes up only just so much gas as is required. (3) A carburetter provided with transverse partitions fitting close up against the right and left side walls of the vessel alternately, and terminating at their other ends at short distances from the corresponding walls of the vessel, so that air forced in is caused to flow in a zig-zag course through the carburetter over the surface of the gasoline, and thereby to generate gas.

Generating Acetylene Gas.—Mücke, J. & J., of Berlin. No. 26,435; Nov. 12, 1897.

The apparatus consists of a water-tank in which is arranged a bell having a dome for the gas outlet-pipe. Underneath the bell are arranged



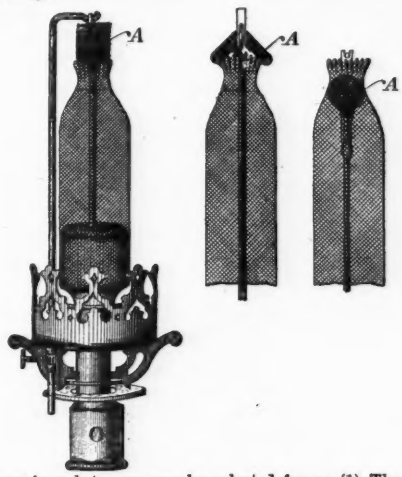
the calcium carbide receptacles, each having a cover formed with turned-down edges. The receptacles are arranged at different heights, so that the water entering the tank cannot reach all of them at once, but fills them successively. The carbide within the receptacles is covered by a bell having a small upper outlet, through which the gas escapes; the object being to force the gas generated to pass through the milk of lime formed by the generation. The bell causes the generation of the acetylene to commence at the top—close to the water-inlet; and consequently the milk of lime formed remains here instead of being able to dissolve. The water-supply tank has a cock or plug in its bottom, communicating by a cord or chain with a lever arm in connection with, and operated by, the rising and falling of the gasholder bell.

Incandescent Mantle Protector.—Carter, J., of Stroud. No. 21,150; Sept. 15, 1897.

This invention consists of a metal appliance hollowed out so as to surround the mantle at its bottom end, and also made adjustable by an inner tube to raise or lower according to length of mantle—the tube fitting tightly on the burner. The exclusion of cold air from the mantle is intended to prevent unequal contraction; while in case a mantle is broken, "the gas is so controlled by the particular shape of the appliance that it cannot strike the chimney."

Automatic Gas Lighter.—Bernstein, M., of Berlin. No. 27,652; Nov. 24, 1897.

This invention relates to a "process for the manufacture of automatic igniters for illuminating gas, according to which organic combustible materials (web, filaments, fibres, and the like) are incorporated with inorganic substances in the form of solutions or otherwise, and the mass formed saturated with a solution of platinum or palladium, or a mixture of the same, whereby after the glowing process, a mineralized, porous body impregnated with platinum or palladium remains, which offers a large surface to the oxygen of the air, for the purpose of increased condensation, and on the supply of illuminating gas comes to incandescence in the well-known manner, either directly, or through the medium of the incandescent mantle or body saturated with a plantinum solution, bringing about ignition."



Such inorganic substance may be selected from: (1) The oxides or salts of the alkaline earth-metals, as calcium, barium, strontium; or (2) the group of earth metals, as aluminium, chromium, beryllium, zirconium, yttrium, erbium, cerium, lanthanum, didymium, thorium. The mass so formed is then saturated in a solution of platinum or palladium, or a mixture of the same. Where the inorganic material is added to the organic in the form of a solution, the two solutions may be previously mixed, and the organic material saturated with same.

The automatic igniter may be manufactured in a variety of forms, and may be combined with an incandescent mantle (as shown) so that either directly or through the medium of the usual plantinum wire, "to enable the platinum constituent of the part of the incandescent body saturated with a decomposable solution of platinum, to effect with certainty automatic ignition on opening the gas-cock."

Manufacturing Incandescent Bodies.—Bernstein, M., of Berlin. No. 29,796; Dec. 16, 1897.

This invention relates to the manufacturing of incandescent bodies which are said to "offer the advantage of resisting better and of possessing a stronger lighting power than those actually in use." The substance employed is composed of vegetable fibres, of hair or asbestos, of calcined or non-calcined clays or earths—especially fire-brick, steatite, porcelain clay, also artificial or natural meerschaum—or combinations of these products, which are impregnated in one of the following mixtures in suitable proportions, in a liquid form or in the form of powder: (1) Indium, erbium. (2) Indium, erbium, aluminium. (3) Erbium, ytterbium. (4) Erbium, zirconium, calcium, zinc. (5) Zirconium, barium, erbium. (6) Erbium, aluminium. (7) Erbium, ytterbium, cerium. (8) Indium, erbium, magnesium. (9) Erbium, calcium, indium. (10) Erbium, cerium (hydrargyrum). (11) Erbium, decipium. (12) Erbium, thorium. The patentee remarks: "Each of the above-mentioned mixtures is specially claimed and contains erbium as a principal element, the practical use of which, for the above purpose, has hitherto had no result."

Manufacture of Inflammable Gas, and Composition to be Used Therein.—Lee, G. W., Elliott, F., and Tatham, G., of Sydney, N.S.W. No. 30,689; Dec. 28, 1897.

This apparatus, which is designed for the production of "inflammable gas for illuminating and heating purposes, as well as for use as a source of motive power for driving gas-engines and the like," comprises two essential features—a peculiarly constructed air supplier and moistener, or pump, and a generator, so arranged as to automatically manufacture the gas only as it is required for consumption or storage.

In introducing their specification, the patentees say: "The process consists in impregnating atmospheric air with as much aqueous moisture as it will hold, and passing same through fine shavings saturated with a specially prepared liquid composition, contained in a small chamber or

small chambers in the generator. The special composition consists of the three following ingredients—viz., $(C_2H_5)_2O$—commercial sulphuric ether—citronella oil, and water, in the approximate relative proportions of one part by weight of each of the first and second ingredients, to four parts by weight of water."

In view of an article which appears elsewhere (p. 823), it is hardly worth while occupying further space in reference to the invention based on the claims put forward by the so-called patentees.

APPLICATIONS FOR LETTERS PATENT.

7424.—Marmuse, M., "Blow burner for incandescent gas lighting." March 28.
7427.—Liddle, J., "Manufacturing gas." A communication from L. O. Triebel and D. Whiteis. March 28.
7433.—Kirkham, W., "Gas-heated furnaces." March 28.
7482.—Sisson, W. H., "Gas and oil engines." March 28.
7499.—Watson, W., and Gray, J. B., "Producing gas for lighting and other purposes." March 29.
7521.—Daix, V., "Production of acetylene gas." March 29.
7574-5.—Thompson, W. P., "Producing calcium carbide." A communication from C. L. Wilson, C. Muma, J. W. Unger, H. Schneckloth, A. P. Brosius, and J. C. Kuchel. March 29.
7591.—Buerkle, A., "Gas-burners." March 29.
7592.—Coyne, J., "Manufacture of gas." March 29.
7601.—Robinson, H., "Gas-engines." March 30.
7609.—Ramsbottom, R., and Rofe, H. J., "Street lighting by acetylene." March 30.
7665.—Limelle, A. E. A. P. de, "Acetylene lamps." March 30.
7675.—Fourchotte, M. C. A., "Acetylene gas generators." March 30.
7685.—Lépine, J., "Production of acetylene gas." March 30.
7686.—Richmond, E. W. T., "Gas-meters." March 30.
7770.—Straëhl, E. de, Réchard, A., and Devarenne, A., "Generating acetylene gas." March 31.
7775.—Henwood, T., "Controlling the gas supply to incandescent burners." April 1.
7777.—Bond, E. S., "Acetylene gas-lamps." April 1.
7791.—Bond, E. S., "Preventing or retarding the decomposition of carbide of calcium." April 1.
7805.—Collins, J., "Gas-burner and illuminator." April 1.
7809.—Osten, W., "Generators for acetylene gas." April 1.
7838.—Szepczynski, S. de, "Acetylene gas generator." April 1.
7950.—Snell, C. S., "Burners for incandescent gas lights." April 2.
7951-2-3.—Naef, P., "Making coke and saving bye-products." April 2.

Stockton and Middlesbrough Water Supply.—At the meeting of the Stockton and Middlesbrough Water Board last Wednesday, it was reported that the income for the twelve months ending Feb. 14, was £953 more than the previous year, while the expenditure was £471 less—the total profit amounting to £2480 more than that for 1896-7.

The Burnley Gas Committee and their Tar Contract.—The Gas Committee of the Burnley Corporation have accepted a tender at 16s. 1d. per ton for the tar made at the gas-works during the ensuing year. The price for the last two years had been 27s. a ton; and the reduced price, which was the highest offered, will mean a loss in revenue of £1500 a year, or more than a rate of 1d. in the pound.

The Land for the Newcastle Gas-Works Extensions.—Early in the year we referred to the arbitration proceedings which had been instituted under the Newcastle and Gateshead Gas Act, 1896, and the Lands Clauses Act, to determine the amount to be paid by the Gas Company to the Corporation for certain land which they wished to acquire for works extensions. The Umpire (Mr. C. Oakley) has issued his award. The Corporation asked for £45,000, but the award only gives £18,000.

Leeds Water-Works Extensions in the Washburn Valley.—During the past few weeks arrangements have been made by the Water Committee of the Leeds Corporation for the purchase of a large quantity of property for the extension of the water-works. The total area is upwards of 200 acres in various parts of the Washburn Valley; and the entire estimated cost amounts to £9260. The Council last Wednesday sanctioned the purchase, and also authorized the Committee to treat for the acquisition of another estate.

The Reigate Corporation and the Gas-Works.—At the meeting of the Reigate Town Council on Monday last week, the Mayor (Mr. F. E. Barnes) reminded the Council of what had been done in opposing the Redhill and Reigate Gas Bills, and moved: "That the Town Clerk give notice to the Companies of the intention of the Corporation to promote a Bill in the next session of Parliament for the purchase of both undertakings; and that the Parliamentary Committee be authorized to take the necessary preliminary steps." The motion was agreed to.

The Public Lighting of Plymouth.—Application has been made by the Plymouth Corporation to the Local Government Board for sanction to a loan of £2500 for the purpose of carrying out the agreement with the Plymouth and Stonehouse Gas Company for the purchase of the street-lamps. An inquiry into this and other matters was held last Wednesday by Major-General Crozier, R.E., one of the Board's Inspectors. The Town Clerk explained that in the early part of the century Plymouth was supplied with gas by an oil-gas Company, and later with coal gas by the present Company. The lamps erected from time to time were claimed by the Corporation under an old Act of Parliament, and they were also claimed by the Company. A short time ago, the Corporation consulted Mr. C. R. Bellamy, the Inspector of Street Lighting to the Liverpool Corporation, who advised them to settle the dispute, and take over the lamps. Negotiations ensued; and the Corporation provisionally agreed with the Company to buy the whole of the lamps in the borough for £2500. This was not the value of the lamps, but was a sum agreed upon to close the dispute. For this the Corporation acquired the whole of the lamp-columns and lanterns; but the lanterns had to be given back to the Company when they were thrown out of use, as they would be when the incandescent light was adopted. The Borough Surveyor added the information that 1922 lamps were included in the purchase, and that the ordinary cost of a similar lamp when new was about £3.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Borough Funds Act, 1872, and Gas Companies.

Sir,—The decision of Mr. Justice North, granting an interim injunction restraining the Corporation of Swansea from paying the costs of opposing my Company's Bill out of the borough funds or district rates without the consent of the ratepayers, is one of great importance to gas and other companies.

It is satisfactory to know that, whatever legal doubt there may have been on the point before, corporations and urban district councils will, *so long as the law remains as at present*, be compelled to obtain the ratepayers' consent to oppositions of a similar kind.

The increasing tendency to municipalize all local enterprise as soon as it pays, backed up as it is by the powerful organization known as the Municipal Corporations Association, makes it all the more important that gas and water companies should continue to enjoy the safeguard which the Borough Funds Act gives them.

They stand in serious danger, however, of being deprived of this safeguard, and of having their very existence placed in serious jeopardy, if a Bill promoted by the Municipal Corporations Association to amend the Borough Funds Act, 1872, is allowed to become law. The effect of this Bill, which is now waiting for second reading in the House of Lords, is to make it infinitely easier to promote Bills for (among other purposes) the compulsory acquisition of local gas companies; while as regards oppositions to Bills, it is proposed to altogether relieve the local governing body of the necessity of obtaining the consent of the ratepayers.

I enclose a copy of the Bill. The selection in the schedule of the "acquisition of the gas undertaking" as one of the objects of Bills to be promoted under the proposed relaxed conditions, is very ominous.

The Bill should be opposed as a matter of principle by every gas and water company in the kingdom; and I suggest that all companies should instruct their Parliamentary Agents to do what is necessary to prevent the Bill passing into law.

With a view to securing cohesion among gas men on this subject and others affecting gas interests, I would suggest a meeting at an early date—say, at the Westminster Palace Hotel; and I should be pleased, if the suggestion meets with the approval of any considerable number of your readers, to make the necessary arrangements.

Swansea, April 7, 1898. Thornton Andrews.

[Enclosure.]

The Bill consists of eleven clauses and a schedule. Clause 3 gives power to one-twentieth of the electors to require a poll on the question of promoting a Bill in Parliament; and by clause 6 the Bill, or part thereof, is to be withdrawn in the event of the result of the poll being adverse. The Act will not take away or diminish any rights or powers now possessed under any Local or General Act. By clause 10, the following proviso in section 4 of the Borough Funds Act, 1872 (35 and 36 Vict., cap. 91) is repealed: "Provided further, that no expense in promoting or opposing any Bill in Parliament shall be charged as aforesaid unless such promotion or opposition shall have had the consent of the owners and ratepayers of the district, to be expressed by resolution in the manner provided in the Local Government Act, 1858, for the adoption of that Act." The Act is to apply to Ireland, with certain modifications and additions. The following is the form of voting-paper given in the schedule:—

		For.	Against.
Are you for or against?	The whole Bill	..	
	Part IV. of the Bill (Acquisition of the Gas Company's undertaking)		..

Directions to the voter follow.

Booth and Others v. The Gaslight and Coke Company.

Sir,—I do not think a very clear idea of this case can be obtained from the law report. The case turned upon the meaning of the phrase "increase in the Company's business." The cement makers understood it in the sense in which it had always been used; while the Judge adopted the contention which the other side put forward, that it meant increase of coke made for sale, and gave judgment for the defendants.

There was no question about the increase in gas. Colonel Makins, in an interview with Mr. White, the Chairman of the Cement Makers' Alliance in October, 1896, "spoke at that time of 7 or 8 per cent. as the probable increase." In January, 1897, he told Mr. White it had been 8½ per cent. Hence Mr. White's claim for the additional quantity of coke. The same figure of 8½ per cent. was given in the February report; and at the general meeting, the Governor stated that the increase from Jan. 1 to Feb. 3 had been at the rate of 10·7 per cent.

The clause in the contract containing the phrase in question reads thus: "Should the increase in the Company's business between now and the end of the year enable the Directors to do so, they will give you the refusal of a further quantity of coke, not exceeding 50,000 tons, at the same price; the period of delivery of such further quantity to be subsequently arranged." The price was 8s. per ton fixed by the Company. The cement makers did not tender; but on being told the price they applied for 350,000 tons, and were cut down to 150,000 tons, with the option of another 50,000 tons on the conditions set out above.

The clause was first given in a letter from Mr. Field, dated Oct. 6, 1896; and on the same day Colonel Makins said in a letter to Mr. White: "*If the output of gas increases*, we may have a somewhat larger amount to dispose of, and will give your Alliance the call of it, at the same price, up to 200,000 tons."

In another letter, in the voluminous correspondence brought before the Court, dated Oct. 7, the Colonel, referring to the extra quantity, said "which *the increased make of gas* will, I think without doubt, enable us to furnish." And again, on Oct. 10, he wrote: "We were only able to accept the offer of the Alliance for the amount we offered previously - viz., 150,000 firm and 50,000 if we have an extra quantity (which looks very likely) from *our increased output of gas*." [All the italics are mine.]

The output of gas, as already stated, having been more than was expected, the cement makers made their claim. On January 21, 1897,

the Governor wrote to Mr. White, quoting the clause, and saying: "The actual result of the Company's *coke manufacture* for the past three months has been that the estimated make (on the basis of which our sales were calculated last October) has not been exceeded; and therefore the Company are not in a position to make any offer of the 50,000 tons in question. We are, however, prepared to make the same arrangement with you as has been agreed to by some of our other Beckton coke-buyers —viz., that for any quantity you may be supplied with in any month in excess of the monthly contract quantity, you shall be charged at the rate of 9s. per ton." This was the first mention of coke instead of "output of gas" or "increase of business," in interpretation of the clause; and on Jan. 29, 1897, the Governor wrote, in reply to Mr. White, that, "one reason why the increased quantity of gas sold has not been accompanied by a corresponding increase in the quantity of coke made for sale is that the quantity of oil-gas made during the past half year has been larger by 75 per cent. than in 1895. This has, of course, operated in two ways—less coke has been made (there being none in the oil-gas manufacture), and a large quantity of coke used by the Company in the production of the water gas to be carburetted." The Governor stated at the February meeting that 26,500 tons of coke had thus been taken off the market during the previous six months; and in August he said that 68,800 tons had been taken off the market in the June half year, against only 27,700 tons in the six months to June, 1895.

But, for all this, the Company had quite enough coke to enable them to give the extra 50,000 tons to the cement makers. That they had coke to spare is proved by their offer in the letter of Jan. 21, to supply extra quantities at 9s. per ton; and if further proof were necessary it is found in the fact that they had actually sold to Mr. Keep and Mr. Harrison 40,000 tons at 9s. which these gentlemen bought for the Cement Makers' Alliance. And even then there was a good stock left.

I do not believe that Colonel Makins, when writing of "the output of gas" and "the increased make of gas" as the condition of giving the extra quantity of coke, had any mental reservation about output of coke. Whether the Secretary had anything of the kind in his mind, I cannot say; but it came out in evidence that he knew—before the coke contracts were made – that the make of oil gas was to be largely increased. If so he must also have known that there would be little or no increase of coke. What then could have been the use of proposing such a clause? It certainly tantalized and deceived the cement makers, created a feeling in their minds that the Company have not honourably fulfilled their engagement, and was the direct cause of litigation which must be injurious to both parties. "The glorious uncertainty of law" has, however, favoured the Company; and a new meaning has been given to the old and hitherto thoroughly understood phrase "increase of business" in connection with gas, which I venture to say had never before been used in the sense now given to it.

I have stated the facts to the best of my ability and leave your readers to form their own opinion of the transaction.

GEORGE LIVESEY.

April 7, 1898.

P.S.—Since beginning this letter this morning, I have received (by the courtesy of Colonel Makins) an advance copy of the reply to my speech at their last meeting. I have purposely not examined or read it before finishing this letter, in order to avoid the suspicion of being influenced by it. If its 45 pages are not too much for the "JOURNAL," I hope to see it in your pages shortly.—G.L.

Mr. Grieve on the Comparative Cost of Gas and Electricity.

SIR,—Will you kindly permit me to correct some slight errors which occur in "Notes from Scotland" appearing in your issue of the 5th inst., in which reference is made to a paper read by me at a meeting of the Royal Scottish Society of Arts. The cost of lighting the hall by Welsbach lamps should be 1·3d. per hour (not 1s. 3d.). Had I restricted the light in candle power to the same amount as obtained from 24 16-candle glow lamps by which the hall is ordinarily lighted, 9 Welsbach lamps would have been ample, and the cost 0·93d. per hour, as contrasted with 5½d. for electricity. Each lamp was fitted with a Peebles regulator, adjusted to pass 3 cubic feet per hour, and the illumination was brilliant.

As regards Mr. Preece's efficiency diagrams, the 12-candle power glow lamp required about 2 watts more in *one thousand hours*, but at that time only gave a light equal to 9¼ candles. My only object in exhibiting these diagrams was to prove that, taking the best average results, 4 watts per candle was a fair basis for comparison with gas, which in Edinburgh, when consumed with common burners fitted in Peebles regulators or "Needle" burners, was half the cost of equivalent light obtained with glow lamps at full efficiency; also that, while the efficiency of the glow lamp gradually diminishes, the light obtained from the governor burner remains quite constant.

The section of the paper of greatest interest to gas consumers referred to a series of tests made by the author showing the volume of gas which must be consumed to obtain equivalent light from different burners. Tests made with lamp governors to illustrate the practice of different towns showed that in one case equivalent light was obtained by consuming 33⅓ per cent. more gas; this result being due solely to the inefficiency of the burner.

The phrase "low-quality gas" is not a very happy one, because what is described as low-quality gas in Scotland would be high-quality gas in England. I only advocate the reduction of Edinburgh gas to 20 candles for the reason that larger burners could be used for ordinary lighting. For Welsbach lamps no more gas would be required than at present. Nor would more be required per horse power for gas-engines. At the same time the price per 1000 cubic feet could be considerably reduced. As new works are about to be erected for Edinburgh, this affords a favourable opportunity for making the change.

G. K. GRIEVE.

Edinburgh, April 7, 1898.

The Southampton Gas Company's Rating Appeal.—The award has been made in this appeal (*ante*, pp. 537, 599, 659). It gives a reduction of £1836 in the rateable value. The costs of the appeal and the reference are to be paid by the Guardians; the costs of the Arbitrator's award to be divided equally.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress was made with Bills last Tuesday, when the House adjourned for the Easter recess:—

Bill brought from the Commons and read the first time: Thanet Gas Bill.

Bill read the third time and passed: Liskeard Corporation (Water) Bill.

HOUSE OF COMMONS.

THE MANAGEMENT OF THE GASLIGHT AND COKE COMPANY.

As mentioned in our editorial columns last Tuesday, notice had been given by a member to ask the First Lord of the Treasury if he was aware of the very grave dissatisfaction felt on the north side of the Thames with The Gaslight and Coke Company's charges for gas, as compared with those prevailing on the south side; and if he would grant a Committee to inquire as to the prices charged by the Company for the last ten years, the profits earned during the same period, and the difference in the price of gas supplied on the north and south sides of the Thames. The question was put on the previous evening by Mr. D. H. Coghill, the member for Stoke-upon-Trent; and it was answered by the President of the Board of Trade, at the request of Mr. Balfour. Mr. Ritchie said it did not seem necessary to appoint a Committee to inquire into the prices charged by the Company, or into the differences in the prices of gas supplied on the north and south sides of the Thames. These were matters of fact which could be easily ascertained and shortly stated; but if the hon. member would put down a motion for a return on the subject, he would request the Company to endeavour to supply it.

On the following day, Mr. Pickersgill, the member for the South-West Division of Bethnal Green, asked the President of the Board of Trade whether he had received a copy of a resolution passed at a conference of delegates from Local Authorities north of the Thames, and within the area of supply of The Gaslight and Coke Company, held on the 28th ult. [see *ante*, p. 778], praying that a Board of Trade inquiry should be held into the past and present management and working of the Company, with a view to putting an end to the anomaly whereby gas consumers on the north side of the Thames have to pay 3s. per 1000 cubic feet, as against 2s. 3d. per 1000 cubic feet charged on the south side; and whether he would institute such an inquiry. Mr. Ritchie replied that the resolution referred to in the hon. member's question had not been received, but when it was he would give it his careful consideration with a view to seeing whether or not the desire of the memorialists could be acceded to.

The following further progress was made with Bills down to Tuesday last, when the House adjourned till the 18th inst.:—

Bill brought from the Lords and read the first time: Liskeard Corporation (Water) Bill.

Bill read a second time and committed: Aberystwyth Gas Bill [Lords].

Bill reported: Crawley and District Water Bill.

Bill read the third time and passed: Thanet Gas Bill.

Petitions against The Gaslight and Coke Company's Bill have been presented from the Vestries of Chelsea, Fulham, and St. Martin's-in-the-Fields. The Fulham Vestry do not pray to be heard; and the petitions from the other Vestries are for an inquiry into the Company's affairs.

As notified in the "JOURNAL" last week, The Gaslight and Coke Company's Bill has been referred to a Select Committee. Should it pass the ordeal, and be reported, Sir Albert Rollit will move its rejection when it comes up for third reading.

The Chairman of Committees (Mr. J. W. Lowther) has reported, in regard to the Crawley and District Water Bill, that they fully considered a report received from the Local Government Board, and gave effect to its recommendations so far as it seemed desirable to them to do so. With reference to the part of the report emphasizing the importance of preserving the sources of water supply from pollution, the Committee deemed it advisable, pending the settlement of a clause of general application for insertion in all Water Bills of the present session, and in order to secure uniformity of treatment, to leave the Bill as it stood for the present, with a view to the insertion of a clause at a later stage; but it was proved to them that the supply of water was derived from deep borings, and therefore it was hardly possible that any such pollution from the surface could take place as mentioned in the report.

Mr. Lowther has also reported from the Committee on the Enfield Gas Bill that the reports received from the Local Government Board and the Home Office were considered by the Committee. In accordance with the recommendations contained therein, the Committee struck out clause 47, providing for the representation of the Company in bankruptcy or similar proceedings, and amended clause 46, relating to the recovery of charges, so as to limit it to charges made by the Company for materials supplied or work done in connection with pipes, meters, or fittings.

Reports from the above-named Departments in reference to the St. Anne's-on-the-Sea Gas Bill were considered by the Committee on that Bill, which was not opposed. Mr. Lowther has reported that clause 69, dealing with the same matter as clause 47 of the Enfield Bill, had been struck out prior to the Bill coming before them; and that the other clauses referred to in the reports have been passed in accordance with precedents.

The York United Gas Bill has also been amended in compliance with suggestions from the Local Government Board.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Tuesday, April 5.

(*Before Mr. Justice* KENNEDY, *without a Jury.*)

Thom v. Shanklin Urban District Council.

This was an action by an artesian well engineer against the defendants to recover £253 15s. alleged to be due to him in respect of a contract made with the defendants to continue the boring of an artesian well at Upper Oxlease, near Shanklin, for the purpose of supplying the district with water. In pursuance of the contract, the plaintiff continued the boring to a depth of 460 feet, when, by direction of the Local Board, he discontinued the work. When he had bored to a depth of 330 feet, he proposed to insert 4½-inch tubing. This was objected to by the Water Committee of the Board, on the grounds that the tubing was too small. Plaintiff continued the boring for 130 feet without inserting any tubing; and in respect of this length the defendants refused to pay, on the grounds that the work had not been completed according to the contract, which provided that in all matters relating thereto the decision of the Board's Engineer should be binding; that payment was to be made by instalments upon the certificate of the Engineer that the work had been done to his satisfaction; and that he had not certified that the amount claimed was due to the plaintiff.

Mr. C. A. RUSSELL, Q.C., and Mr. R. CUNNINGHAM GLEN appeared for the plaintiff; Mr. JELF, Q.C., and Mr. MONTAGUE LUSH represented the defendants.

Justice KENNEDY, in giving judgment, said the plaintiff was employed in sinking and boring operations, which had been commenced by one Parsons, who died, and the plaintiff contracted to carry on the work. The question was whether he was entitled to the sum claimed under the terms of the contract. It was not disputed that he did in fact bore to the depth for which he claimed payment. If his claim was right, then there was no question as to the figures. He said he was entitled to recover for the distance bored, on the ground that tubing was dispensed with by the Board. The defendants said that by the terms of the contract the plaintiff had to obtain the certificate of their Engineer for the amount for which he claimed in the action. He thought this defence was ill-founded. Fairly read, the contract had to be confined to certificates for the work in progress, if the Contractor wished to be paid by instalments. In the present case, he did not ask to be so paid. Was the plaintiff entitled to recover, looking at all the facts of the case? He (his Lordship) thought he was not, as the work was, in his opinion, to be one of boring and tubing. The plaintiff was to be paid for the distance bored and tubed, and not for any distance bored and not tubed. He therefore came to a conclusion adverse to the plaintiff, and gave judgment for the defendants, with costs.

The Use of Subways by the Hydraulic Power Company.

In the Court of Appeal a short time since, Lords Justices A. L. Smith, Chitty, and Collins had before them an appeal by the London Hydraulic Company from a decision of Justices Wright and Kennedy, sitting as a Divisional Court, upon a special case stated by consent. The action was brought by the London County Council against the Company to recover £185 5s. by way of remuneration or rates payable in respect of their use of certain subways under Queen Victoria Street, Victoria Embankment, Northumberland Avenue, Shaftesbury Avenue, Charing Cross Road, Southwark Street, and Rosebery Avenue. The question raised was whether the Company were a water company, for, if they were, the charge for the use of the subways would only be £32. The Divisional Court held (see "JOURNAL" for Nov. 16, 1897) that the defendants were not a water company, and that therefore they should be charged on the higher scale. They accordingly gave judgment for the plaintiffs. The Company appealed; and their case was argued by Mr. Cripps, Q.C., and Mr. Loehnis—Mr. Dickens, Q.C., and Mr. English Harrison appearing for the Council. Their Lordships dismissed the appeal. Lord Justice Smith said the only thing that made him doubt at all in this case was the hesitation felt by Mr. Justice Kennedy in the Court below and by Lord Justice Collins in that Court. Speaking for himself, he thought the case perfectly clear. The defendants were a company for the purpose of supplying water power for lifting weights and similar purposes. They were prohibited from supplying water for ordinary use. Were they a water Company? In his opinion they were not. They used water for hydraulic purposes and for nothing else. Section 5 of the Subway Act of 1893 made a special exception as to charges in the case of gas and water companies; and all other companies were to pay the ordinary charges as laid down in the bye-laws. Lord Justice Chitty delivered judgment to the same effect. Lord Justice Collins agreed. He said that during the argument he shared the misgivings felt by Mr. Justice Kennedy in the Court below. The point he had a difficulty about was not whether this was an ordinary water company. But what was the meaning of the term "water company" as used in the Subway Act and in the bye-laws. The defendants had a right to break up the streets for the purpose of laying pipes. But he came to the conclusion that, for some reason which he did not understand, the Legislature had placed ordinary gas and water companies upon a different and better footing than other companies.

Corporations and the Supply of Electric Light Fittings.

The power of Corporations to trade in electric light fittings was a question recently decided at the Leicester County Court. The Corporation sold to a certain person some lamps and fittings, and sued for the amount. Defendant admitted the purchase, but contended that the Corporation, though the Electric Lighting Authority, had no power under their Act to trade generally in fittings; and that they could not maintain an action for the recovery of the price of such fittings. His Honour Judge Wightman Wood, in delivering judgment, said the matter was one of unusual importance to come before a Court having limited jurisdiction. After reviewing the facts of the case, he said that under the Electric Lighting Act, 1882, the Corporation were licensed by the Board of Trade to supply electricity for public and private purposes; and besides laying wires, erecting the necessary machinery, and supplying the electric energy to such householders as liked to have it, they had opened a shop for the sale of lamps and such fittings as were required in houses by persons who used the electric light. No attempt had been made to confine the sale to householders who took electricity, nor was the defendant such a person. He was an engineer having a similar business of his own; and the articles he purchased from the Corporation he added to his stock. A corporate body could only do such things as it was authorized to do by its Charter, Act of Parliament, or means of association which brought it into being, or supplementary Acts or Charters including all such things as were necessarily incidental to the expressly-authorized objects. All other things it was prohibited from doing. The plaintiffs' Charter was not produced, as it was conceded by their advocate that no right to trade could be deduced therefrom; and he relied entirely on recent electric lighting legislation. Having reviewed the various sections of the Acts of 1882, 1888, and 1890, his Honour said he could see nothing by reasonable implication to authorize the Corporation to supply any internal fittings except meters. For the Corporation, great reliance had been placed upon a form of account sent down by the Board of Trade; and it certainly appeared from this that the person who drew it up contemplated that the Corporation would buy and sell lamps and other apparatus, and it might be that the Corporation had taken their cue from it, and had commenced trading in lamps on the strength of its wording. He was, however, of opinion that a mere indication by a Government Department that in its judgment a thing might be properly done, could not have the effect of authorizing that which otherwise would be contrary to law. Section 9 gave the Board of Trade no power to authorize anything at all, but merely to prescribe the form in which the Corporation were to present the accounts of the undertaking authorized by the Act—viz., the supply of electrical energy. He was therefore of opinion that the contention of the defendant that the Corporation had acted beyond their legal powers in selling the articles in question was correct. Defendant, however, having taken and kept the goods under an implied promise to pay, the question arose as to whether he could set up as a defence to an action for the price that it was *ultra vires* of the Corporation to sell. In his opinion, he could not, for, having had the goods, the defendant could not be allowed to refuse to pay for them on the ground that the Corporation went beyond their legal right in selling them, and could not have been held to their contract to deliver them had they refused to do so. The defendant had got what he bargained for; and, in his opinion, he must pay the price, notwithstanding the flaw which he had rightly called attention to in the capacity of the Corporation to carry on their business. As he was against the plaintiffs on the point on which they relied, and which the parties came there to contest, he would not give costs; and judgment would therefore be entered for the plaintiffs for the amount sued for (£4 19s.), but without costs. Leave to appeal was given.

Sequel to the Acetylene Exhibit at the Birmingham Cycle Show.

In the Queen's Bench Division last Tuesday week, before Mr. Justice Kennedy, the case of *Bond v. The Midland Cycle and Motor Car Exhibition Company, Limited*, came on for hearing on further consideration. The action was for breach of contract. Plaintiff was a cycle lamp maker, and rented a stall at the Bingley Hall Show from the defendants for the exhibition of acetylene gas-lamps. They were shown for two days, and then the defendants required the removal of the lamps; the authorities having, it was said, intervened on the ground that the lamps were dangerous. The case (as reported last week) was tried at the Birmingham Assizes; and the jury, coming to the conclusion that acetylene gas was not dangerous under the circumstances in which it was exhibited, found for the plaintiff, assessing the damages at £15. Judgment was opposed by the defendants on the ground that the exhibition of the lamps by the plaintiff was illegal, because no licence had been obtained from the authorities under the Petroleum Act. Mr. Greene, Q.C., for the plaintiff, now asked for judgment upon the verdict of the jury in his favour. Mr. Vachell and Mr. Harington argued the case on behalf of the defendants, contending that the plaintiff in using a large generator was acting illegally under the Act. The defendants had been perfectly honest and *bonâ fide* in what they did; and they only required the plaintiff to remove his lamps on being assured by an insurance company that his exhibit was dangerous. His Lordship held that the defendants had not made out their case, and entered judgment for the plaintiff in accordance with the Jury's finding.

The Contract for the New Gasholder at Exeter.—What may be regarded as the final reference to the question of the placing of the contract for the new gasholder and tank for the Exeter Gas Company was made at a meeting of the Council of the Exeter Chamber of Commerce last Wednesday. A letter was read from Mr. W. A. Padfield, the Secretary to the Company, acknowledging the receipt of the resolution passed by the Council regretting that the contract had been sent out of Exeter, notwithstanding the fact that the tender of a city firm was lower than that accepted. Mr. Padfield said he was desired, "as a matter of courtesy to the Chamber," to state that the Directors of the Company were "precluded from accepting the tender of Messrs. Willey and Co. because it contained conditions of an objectionable nature, altogether different from those on which the other firms tendered." In reply, the Secretary of the Chamber of Commerce was directed to write repeating the expression of regret that the contract had not been placed with an Exeter firm, and adding that the Council heard with pleasure, through one of its members, that "the Directors of the Gas Company will take care that, in future, whenever possible, work shall be placed with Exeter tradesmen, and that in connection with the present contract the Directors will stipulate that, so far as possible, Exeter labour shall be employed." A letter was also read from Mr. H. A. Willey, in which he thanked the Council for their action, and said he could not conceive how it was possible that the suggestions contained in the letter of his firm to the Gas Company—a summary of which was published in the "JOURNAL" last week—should have been considered in any way objectionable.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

Reply of the Directors to Mr. George Livesey's Criticisms.

The Directors of The Gaslight and Coke Company have put in circulation a pamphlet containing their promised reply to the criticisms directed against the policy of the Board by Mr. George Livesey at the half-yearly general meeting held on Feb. 4 last, and reported in the "JOURNAL" the following Tuesday. The pamphlet opens with these words: "After the speech of the Governor, in moving the adoption of the report and accounts, as reported by the 'JOURNAL OF GAS LIGHTING' of Feb. 8, 1898, Mr. George Livesey, Chairman of the South Metropolitan Gas and Crystal Palace District Gas Companies, who was present as a shareholder, made some comments of an adverse, if not hostile character on the general policy of the Court of Directors, and a strong personal attack upon the Governor and General Manager respectively." There is then set out the full text of Mr. Livesey's address, as given in the number of the "JOURNAL" above referred to, and which it is of course unnecessary to reproduce here. The importance of the subject, however, demands that the remainder of the reply should be given *in extenso*. It is as follows:—

The Court of Directors have decided that the following statement shall be circulated among the shareholders in reply to Mr. Livesey's attack. No notice was given by Mr. Livesey, prior to the meeting, that he intended to call attention to matters which did not arise out of the working accounts of the half year under consideration; and it was therefore not possible, at the time, to deal fully and in detail with his charges and figures. Mr. Livesey, in his opening sentences, put the question, "Was the Company as well managed as it could or might be?" and, in order to support his contention that it was mismanaged, he made certain comparisons and quoted certain statistics, selected and limited by himself, for the purpose.

It is proposed to deal with each of the allegations and charges in the order in which they were made. The first relates to

THE COMPANY'S DISTRICT.

Mr. Livesey's statement is that the Company's district is unrivalled. This he has repeated in the speeches delivered by him from time to time, and the context has always shown that he wished the public and the proprietors to believe that this Company's district, as compared with that of the South Metropolitan Company, is a most profitable one for the purposes of gas supply. But the facts show that the district of the South Metropolitan Company is a much more paying one than that supplied by this Company north of the Thames.

The printed and audited accounts show that, while this Company, in the fourteen years (1884-1897) which have elapsed since the amalgamation of the London Gaslight Company, obtained an increase of 42 per cent., or an average annual increase of 3 per cent., in its sales of gas, the South Metropolitan Company obtained an increase of 111 per cent., or an average annual increase of 8 per cent. Naturally, a Company having this large increase of business would be able to expend capital far more economically than a Company with less than half such increase; and, in addition to this, by reason of fixed charges (a very comprehensive term) not increasing in the same proportion as sales of gas, the cost of manufacture and distribution in the case of such a Company should undoubtedly be lower than in that of a Company having the much smaller rate of increase.

Again, the introduction of electric light (which has as yet scarcely affected the South Metropolitan Company's district), while it has resulted in the loss of a very considerable amount of gas-rental in the rich City and West-end districts of this Company, has not led to the removal from the Company's books of the names of those consumers who are now users of the rival light, but who retain the Company's meters in most cases, so that the Company's inspectors and collectors have to make their periodical visits as frequently as they did when the consumption of gas was unaffected by the competitive light. Moreover, the mains, service-pipes, and meters have to be maintained in order, although for a consumption of gas in most cases of a nominal quantity only. All this tends to increase the comparative cost of repairs and maintenance in the whole of the distribution department.

Again, a specially large area of this Company's district is paved on the most costly systems—viz., with wood or asphalte. [See Appendix Q.] Such pavements, when disturbed for the purpose of laying an ordinary service-pipe to a consumer's house, entail an additional cost of something like 15s. to 20s. to replace. These conditions apply only to a very limited area in the South of London, and are, again, to the disadvantage of this Company's northern district.

But there is another advantage which the South Metropolitan Company possesses which renders its supply of "16-candle" gas much less costly than that of this Company. This is the position of the testing-places which are prescribed by the Gas Referees in relation to the Companies' manufacturing stations. It is now generally acknowledged, certainly by Mr. Livesey (see his letter of Aug. 6, 1896—Appendix B), that gas loses some of its illuminating power in its course through the mains. Mr. Livesey also claims that he is under no obligation (see his letter of July 3, 1896—Appendix C) to supply 16-candle gas beyond the testing-places. If, therefore, the testing-places in the South Metropolitan district are neither so numerous nor so remote from the works as in the case of this Company, it follows that the South Metropolitan Company can manufacture and supply gas of a lower quality than this Company can, and by this means largely save the cost of enrichment.

This Company has fifteen testing-places, situated at distances from the works varying from 10½ miles to ¼ mile. The South Metropolitan Company has six testing-places, situated at distances from that Company's works varying from 3½ miles to ½ mile. Here is an advantage to the South Metropolitan Company of 7 miles in the maximum distance its gas has to travel.

The fifteen testing-places of this Company are scattered all over the Company's district, the area of which is 67 square miles; so that, in the case of this Company, there is one testing-place to every 4½ square miles. The area of the South Metropolitan Company's district is 52 square miles; so that that Company has but one testing-place for every 8½ square miles, and there are no testing-places in the southern parts of its district. Under such circumstances, it is not to be wondered at that, in his report on this matter of June 8, 1894 [see Appendix D], the then Chemist of the London County Council stated: "The gas supplied by the South Metropolitan Company is most inadequately examined;" and that, moreover, he considered himself justified in publishing figures which showed that the gas supplied by that Company was lower in illuminating power than the gas supplied by either this Company or the Commercial Gas Company.

Why the Referees should have dealt with the respective Companies on such different lines, is a question for them to answer. What is clear is that here again the advantages are all on the side of the district of the South Metropolitan Company.

These facts appear to show that the term "unrivalled" is inapplicable to this Company's district.

The next question referred to by Mr. Livesey is that of

RESIDUAL PRODUCTS.

The charge which Mr. Livesey suggests is one which has frequently been made—viz., that this Company's system of disposing of its residual products is at fault, and is, indeed, the cause of the general decline in prices all over the country. This Company's disingenuous critics, however, have never ventured upon a comparison extending over a series of years, but have contented themselves generally with picking out some one item or some one half year which may have appeared to them to be unfavourable. This has been the line adopted by Mr. Livesey. Again taking the figures of the audited accounts of this Company for the fourteen years above mentioned (1884-1897), and comparing them with the corresponding figures of other Companies, the result is that, while this Company's returns for residuals amounted, in the seven years 1884-1890, to 7s. 11·67d. per ton of coal carbonized, the figures for the following seven years, 1891-1897, amounted to 7s. 8·24d. per ton. This is a reduction of 3·43d. per ton. The reduction in the case of the South Metropolitan Company between the same periods was 2·48d. per ton, and of the Crystal Palace District Company (of which Mr. Livesey is Chairman) 9·41d. per ton. Excluding coke from the comparison, the returns for tar and liquor products alone, for the whole period, are as follows:—

The Gaslight and Coke Company . .	3s.	0·13d.	per ton of coal.
South Metropolitan Company . . .	2	4·57	" "
Crystal Palace District Company . .	2	0·05	" "

It may surprise some of those who have heard Mr. Livesey declaim on the subject of residuals to learn that this Company's return for all residuals for the December half of 1897 was 6s. 1·91. per ton of coal, while that of the South Metropolitan Company was only 6s. 0·7d.; and this is by no means an exceptional instance of this Company having done better with its residuals than the South Metropolitan Company, notwithstanding the fact that Beckton, where about one-half of this Company's coke is produced, has no local trade whatever. Where in all this is evidence of mismanagement on the part of this Company? Certainly this Company has not dragged Mr. Livesey's Companies down; for the figures of those Companies are, and have been, below this Company's level.

But what assistance by way of advice does Mr. Livesey give in this matter? At one time he suggests selling by tender or auction (see his letter of Aug. 27, 1892, to the "JOURNAL OF GAS LIGHTING"—Appendix E). At another time he condemns this plan, and urges that friendly negotiations should be the course adopted (see speech, Feb. 5, 1897—Appendix J). At one time he advocates entering into some trade combination—holding residuals in hand; pooling them in company with the general body of tar distillers; and standing out for a price far above the current price of the day (see his letters on "Anthracene" of Aug. 27 and Oct. 7, 1892—Appendix E). (This policy was subsequently adopted by a combination of tar distillers, with—as was to have been expected—disastrous results.) And yet it was Mr. Livesey who stated, on Feb. 14, 1894 [see Appendix G], that he would do his utmost to defeat the object of the Coalowners' Federation—that of forcing up the price of coal. Then, again contradicting himself, he attributes the fall in prices of residuals to the plan of holding stocks rather than selling them at the price of the day (see his speeches, Feb. 16 and 18, 1898—Appendix H).

These most recent utterances of Mr. Livesey were at the meetings of the South Metropolitan Gas Company (Feb. 16), and the Crystal Palace District Gas Company (Feb. 18). On both occasions he complained bitterly of the low prices of tar and other products, and directly attributed them to the action of this Company in selling, or abstaining from selling, at the market price of the day. The remedy he proposed was a combination of the Metropolitan Gas Companies to force up prices; and he added that it all depended on the largest producer—viz., this Company—whether such combination could or could not be effected, and he suggested that the obstacle in the way was the attitude of this Company. Mr. Livesey was quite correct in his suggestion. This Company is, and has been, opposed to such a policy, and for the following reasons.

1. The end sought to be attained would not justify the means. A reduction in the price of gas is very desirable, if brought about by legitimate causes; but arrangements which would be justly denounced as a conspiracy to artificially increase the price of a commodity, as a combination in restraint of trade, as a "corner in tar," or a "ring in residuals," would not be legitimate methods of raising the price of tar and tar products, and, even if the result were a reduction in the price of gas, would not thereby be justified.

2. The Directors of this Company have always denounced such combinations when formed by coalowners, cement makers, or others, and are not prepared for such a *volte face* as would be involved in adopting methods which they have always condemned in others.

3. Such combinations never succeed in the long run, and almost always recoil on those who adopt them.

At various times, conferring together has been urged upon this Company; and the system has been tried. But on some important occasions it has ended in nothing; because the circumstances of the three Metropolitan Companies being quite different, no common basis for agreement as to methods of working exists, and the Directors have always found it absolutely necessary to maintain their independence of action.

In view of all this conflicting and contradictory advice, is it to be wondered at that the Directors of this Company prefer to persevere in their own system, which has resulted in the favourable comparative figures set out above?

It may be well here to refer to the causes which led to the stacking of large quantities of coke at the Company's Beckton station in the years 1895 and 1896, to which Mr. Livesey also referred in his last-quoted speeches.

On Oct. 3, 1895, the members of the Portland Cement Makers' Alliance (a trade combination having for one of its objects the restriction of its members in their purchases of coke with a view to bringing about a reduction in its price) tendered for 248,000 tons of this Company's coke, at the price of 9s. 6d. per ton at Beckton. As other parties had tendered for, or agreed to buy, 200,000 tons at 10s., the Directors offered to supply the allied makers at that price. The Alliance declined to accept this offer unless upon very objectionable conditions, one of which was that the contract should be for three years.

The negotiations, however, were continued for some three months, during which time coke was allowed to accumulate; the Directors having been most desirous not to sever a trade connection which had been in existence for very many years, and having had reason to believe that the cement makers were in want of supplies.

Late in December, 1895, or at the beginning of January, 1896, the Cement Alliance agreed to buy from the South Metropolitan Gas Company, upon terms as to delivery not more favourable to the buyers than those offered by this Company, all the coke that Company could spare them at the price of 10s. per ton. And yet on Jan. 20 following, after much unnecessary delay on the part of the Cement Alliance, the Secretary to that body wrote declining this Company's offer at that price.

A fortnight later, Mr. Livesey, although Chairman of two large Gas Companies—and, as such, interested in the maintenance of the price of coke—thought it becoming on his part, in his speech at the general meeting of this Company on Feb. 7, 1896 [see Appendix F], disregarding altogether the interests alike of the consumers of gas and the shareholders, to advocate the cause of the cement makers—pleading that their trade was so bad that they could not afford to pay this Company 10s. per ton, although that was the price which he had secured for the South Metropolitan Company. This untoward speech was delivered in the presence of the Chairman of the Cement Alliance; and the substance of it was repeated in a letter which Mr. Livesey addressed to the "Journal of Gas Lighting," on the 22nd of the same month [see Appendix I]. Of course, this unprecedented and unlooked-for advocacy of a low price for coke from the Chairman of a Gas Company greatly encouraged the Allied Cement Makers; and, by reason probably of some material assistance afforded them in their difficulty, in the shape of a supply of coke from other gas-works in the Metropolis or in the Provinces, they were eventually successful, by a system of "boycotting" Beckton coke, directly and indirectly, in forcing the position, and were able to stipulate for a supply of coke at a price 1s. below that which they were paying to the South Metropolitan Company.

Thus it was that Mr. Livesey—the uncompromising opponent of combination among workmen to keep up rates of wages—gave full support to a combination of traders to keep down the price of a commodity of which the South Metropolitan Company is one of the largest producers!

The immediate result of these tactics was a large accumulation of coke in London, and a serious fall in its price, which remained at a low level until January, 1897, when it began to rise. The proprietors will now be able to judge for themselves whether or not Mr. Livesey was responsible for the loss of coke revenue during the past two or three years.

Fortunately, however, the danger attending the sale of coke in large quantities to a limited number of buyers, which the action of the Allied Cement Makers in 1895-96 so clearly revealed, no longer exists for this Company; for, while the sales to that body of users of coke have now been reduced from 250,000 to 100,000 tons a year, there has been a large and profitable extension of this Company's export trade, and at the same time the Company has obtained great relief by the introduction of the manufacture of carburetted water gas, which has had the effect of reducing materially the quantity of coke made for sale, so that a repetition of the proceedings of 1895-96 is wholly improbable, if not impossible.

One word as to the Company's railway and export coke trade. Mr. Livesey on one occasion stated (see his speech, Feb. 5, 1897, Appendix J) that this Company was, in the opinion of gas managers, the "curse" of the coke trade—a charge which probably has reference to the Company sending coke from Beckton to the districts of other gas companies.

The absurdity of such a charge is obvious. Commodities will always find their way to markets where prices are highest, whatever artificial barriers may be set up. Moreover, if this principle of restricting trade could be, and were, acted upon, in what position would Metropolitan Gas Companies be as regards coal supplies? Are they really to be dependent only upon the coal-fields which are nearest to London? or do those who object to this Company's system of coke export object also to the export of English coal? What would the Danish Gas Company, for instance, do were it to have to depend for its coal supplies upon the collieries in the vicinity of Copenhagen? Again, what do the various managers of Provincial Gas Companies think they would get for their sulphate of ammonia if Continental Governments prohibited its import, and if, consequently, English farmers were the only buyers of English-made sulphate?

It is too late in the day to declare war against free markets, and to cry out against export, whether from one district to another or from one country to another. Even Mr. Livesey cannot hinder the South Metropolitan Company's coke from finding its way into the district of this Company. Does he even try to do so?

Depletion of Reserves.

Mr. Livesey is then very much moved—or seems to be—at the appropriation of this Company's reserve fund towards dividend purposes; and he says that, when shareholders understand that the amount of the reserve fund and undivided balance in the year 1888 was £807,000, he thinks they will be entitled to ask seriously what has brought about such a state of things.

To such a question the answer is ready and simple. It is quite true that the Company's reserves are £759,000 less than they were on Jan. 1, 1889; but this sum has simply found its way back into the pockets of those who contributed it in the first instance. The £807,000 was the accumulation of excess of profits over dividends—that is to say, the consumers had, when the cost of gas-making was low, paid a price for their gas which resulted in a profit which was more than sufficient for the statutory dividend.

Now the position is reversed. Whereas in 1888 the net cost of making gas, together with the charge for capital, was 2s. 8d. per 1000 cubic feet, the corresponding charge for the years 1889-97 was 2s. 11d., or an increase of 3d. per 1000. But the average price of gas has only been increased by 1d. per 1000; so that, as compared with 1888, the Company has been working during 1889-97 at a reduced profit of 2d. per 1000 cubic feet of gas.

When considering how to deal with this question, the Directors had before them two courses—the first, to raise the price of gas sufficiently to meet the deficit year by year, and to reduce the dividend in accordance with the sliding-scale clause, retaining intact the reserves, which were earning interest at about 2½ per cent. per annum. The second course, which was the one adopted, was to stave off as long as possible—in the interests of consumers and shareholders alike—any increase in the price of gas, and to appropriate the reserves for the purpose for which they were accumulated—viz., the meeting of the deficits on the annual working of the Company.

So the lost £759,000, which Mr. Livesey laments, was divided between the consumers, to the extent of £635,000, and the shareholders, to the extent of £124,000.

Had this question been submitted to the decision of the two parties interested (the consumers of gas and the shareholders) can there be any doubt as to what their reply would have been?

But, as regards this question, the figures of the South Metropolitan Company have corresponded closely with those of this Company; for that Company's funds, which amounted to £254,414 in 1888, were reduced to £37,788 in 1891. From that figure they rose to £101,726, and they have only not fallen to the same level as that of this Company because the distribution of a part of the additional dividend payable under the sliding-scale has been withheld—a course which Mr. Livesey in 1884 (see his speech of Feb. 8 of that year, Appendix O) deemed to be a blameworthy disregard of a sacred principle.

In Appendix K will be found a table showing the variations in the reserves of the two Companies, year by year, during the period 1888-97; and the parallelism in the respective figures will be found to be very interesting and instructive.

Price of Gas.

Mr. Livesey next deals with the proposal to increase the price of gas, which he describes, in exaggerated language, as "a very disastrous thing to do." But when the South Metropolitan Company, having, in the words of Mr. Livesey on Aug. 19, 1891 [see Appendix L], "showed the public that they were willing to use up their reserves . . . rather than raise the price of gas" (precisely the course which has been adopted by this Company), was at length obliged to raise the price of gas by 3d. per 1000, no such words as "very disastrous" then came from Mr. Livesey's lips; but he was confident that, by acting as they had, the Directors of the South Metropolitan Company had done their best to maintain their character as "honest traders." It may surprise some people who have listened to Mr. Livesey at general meetings of gas companies to learn that, during the past fifteen years [see Appendix R], the variations in price (including meter-rents), up and down, of this Company, have corresponded closely with those of the South Metropolitan Company, and that the aggregate reductions of this Company since 1883 have been 5·28d. per 1000, against reductions of 6·83d. per 1000 of the South Metropolitan Company; the larger reduction of the South Metropolitan Company as compared with that of this Company being, not the outcome of exceptionally sagacious management, but simply the natural result of the increase of business of 111 per cent. in the South of London against 42 per cent. in the North. It would be strange, indeed, had such an exceptionally large increase of business not resulted in a correspondingly large reduction in the charge for gas. To give the figures of the aggregate value of these reductions in price to the consumers and the shareholders respectively, the consumers in the district of this Company had to pay less for their gas in 1897 by the sum of £462,500 than they would have had to pay on the basis of the current price of 1883, while the consumers in the South Metropolitan Company's district had to pay £251,706 less in 1897 than at the 1883 price. In respect of these reductions, the shareholders of the two Companies were entitled to additional dividends of £59,221 and £38,718 respectively.

But this Company and the South Metropolitan Company are not the only gas undertakings whose prices of gas have been raised as well as lowered from time to time. This course has been adopted by other gas companies in and around London and in the Provinces, and by some of the local authorities having the control of the gas supply. Moreover, in the case of gas companies, Parliament not only foresaw the contingency, but also provided for it by the application of the principle of the sliding-scale for price and dividend. These being the facts, what justification has Mr. Livesey for describing this Company's recent action in such foreboding terms, as though it were wholly without precedent?

As regards the difference (5·7d.) between this Company's charge for gas in its district North of the Thames and the corresponding charge (for gas and meter-rents) of the South Metropolitan Company, this is fully accounted for thus: First, by the exceptional capital outlay consequent upon the removal of this Company's works from London to Beckton; secondly, by the distance of the Beckton works from the Company's district of supply, and the exceptional character of the supply itself; thirdly, by the absence of a local coke trade at Beckton, where one-half of the Company's manufacture is carried on; and, lastly, by the extra burden of local rates which this Company has to bear as compared with the South Metropolitan Company.

Next as to the question of

Meter-Rents.

Mr. Livesey says that this Company depleted its reserve fund, and so ultimately caused an increase in the price of gas, by abolishing meter-rents, which amounted to £60,000 a year. He says it would have been better, had this Company contemplated such a step, to have asked the other two Metropolitan Companies to meet in conference and discuss the matter. Allusion, however, has already been made to the futility of such

conferences. This concession to the public, Mr. Livesey describes as a "taking away from the revenue of the Company"—suggesting that, by some means or other, somebody has been injured by this proceeding. But he ignores the fact that the persons to whom the £60,000 a year has been given are the consumers of gas themselves. Moreover, is not a reduction in the price of gas "a taking away from or a giving away of revenue?" Mr. Livesey then winds up by further suggesting that it would have been better not to have made this concession, which, up to Dec. 31 last, had resulted in a saving to the consumers of £200,000, but that rather this amount should have been applied to piling up a large reserve fund. What would the consumers say to this?

Mr. Livesey is evidently uneasy in his mind on the subject of his inconsistency as regards this question of meter-rents. Prior to 1876, the South Metropolitan Company did not charge meter-rents, but accepted and acted upon what Mr. Livesey now denounces as "Socialistic doctrine."

It was in 1874, when giving evidence before the Revision Commission appointed by the Board of Trade [see Appendix M], that Mr. Livesey said that the reason why his Company did not charge meter-rents was that such a charge was "obnoxious and objectionable." A House of Commons Committee, sitting in 1876, having all the facts before them, gave the South Metropolitan Company 3s. 6d. as the standard price of gas, and immediately (in December, 1876), in their character, doubtless, of "honest traders," the Directors of that Company said, to quote Mr. Livesey's own words (see his speech, Aug. 3, 1894—Appendix N)—words which probably he will have reason one day to regret—"They [Parliament] have treated us so unfairly that we will take advantage of what the Act gives us. We will put on meter-rents, and this will enable us to reduce our price of gas by 1d., and get an extra ¼ per cent. dividend."

But Mr. Livesey, in denouncing the Directors' action in this matter, takes no account of the fact that this Company was already prohibited, under statute, from charging meter-rents within a portion of its district in the City of London. The Company's difficulty was that consumers of gas occupying premises immediately outside the City boundaries, or in the suburbs, objected to being charged for the use of meters, while consumers within the City of gas supplied by the same Company were wholly free from any such charge. Meter-rents with this Company thus became one of those charges which are not worth the irritation and friction they cause.

Dividends.

Mr. Livesey next complains of the Company paying its full statutory dividend, suggesting that only sometimes is it wise to increase the dividend. But what did he tell the proprietors on Feb. 8, 1884 [see Appendix O], when this Company was dividing 11 per cent. only, although it was entitled to 11¾ per cent.? That by the course adopted "the object of the sliding-scale is thus defeated. It was intended that the prospect of an increase of dividend should make shareholders anxious to reduce the price of gas. If the dividend is not to be increased, this stimulating motive is taken away."

Moreover, what did he recently do in the case of the Crystal Palace District Company? He recommended to the shareholders the payment of a dividend of 5¼ per cent.—that is, ¼ per cent. over the initial rate of 5 per cent.—although the profit earned was only equal to 3·6 per cent.; or, to state it in another way, the profit earned by the Crystal Palace District Company last half year was short to the extent of £4400, or 30 per cent. of the amount required for the dividend which Mr. Livesey recommended should be paid. The percentage of deficit in the case of this Company was 15 only.

And Mr. Livesey was right in 1884, and is right in his practice in the case of the Crystal Palace District Company to-day; for the sliding-scale is the basis of the partnership between the consumers and the Company, and it should be sacredly adhered to, since, on the faith of its existence and regular operation, a large amount of capital has, under the provisions of what are known as the "auction clauses" of this Company's Act of 1876, been raised at high premiums, which have tended to reduce the price of gas. In 1897, the price of gas was 2s. 10d. per 1000 cubic feet, and the dividend payable was 12¾ per cent. In consequence of the diminished revenue from residuals during the past three years, the accumulated funds available for making up the dividends have been from time to time drawn upon, with a view of avoiding an increase in the price of gas; and they are now practically exhausted. Therefore the sliding-scale comes into operation, as it were automatically, to produce the necessary equilibrium between profits earned and dividends paid.

Carbonizing Wages.

Another charge which Mr. Livesey makes against the management of the Company is that the carbonizing wages should have been less by 15d. per ton; and he adds that this represents £129,000 a year, which the Company "might have saved." This is an instance—not an isolated one in Mr. Livesey's attacks—of what is called a "half-truth." Of course, this Company could have saved a considerable sum—perhaps £129,000—in wages, had it substituted either inclined retorts or mechanical stoking apparatus throughout the whole of its works. But, had it been possible to do this, what would have been the cost? To have introduced stoking machinery into all the Company's retort-houses would have been impossible, by reason of their construction not admitting, in all cases, of the system. To have adopted the system of inclined retorts throughout the works would have involved, as the Company's Consulting and Constructing Engineer reports, an expenditure of £1,000,000 or thereabouts, nearly the whole of which would have been a charge against revenue. Thus, assuming that the expenditure of this sum could have been spread over ten years, the annual net saving would have been about one-fifth of the amount stated by Mr. Livesey, and against this one-fifth there would have been some charges in respect of interest on additional capital outlay and wear and tear.

But in some of this Company's modern retort-houses stoking machinery is being adopted, and an important experiment in inclined retorts has been under observation for the past two years, with a view to the adoption of this system, if finally approved, wherever practicable.

It is, however, permissible to compare this Company's wages with those of the Crystal Palace District Company, and the comparison shows that, although that Company has all the advantages of Mr. Livesey's experience and of his profit-sharing scheme, its carbonizing wages are higher than those of this Company, and its carbonizing results are worse than those of any other Gas Company in or near London.

Capital.

Possibly the most serious of the charges made by Mr. Livesey is that relating to capital. This Company's capital expenditure has always been a favourite object of his attacks. In 1887 (see his speech on Feb. 11 of that year, Appendix P) he complained that this Company was charging too little to capital. Now, as on many former occasions, he says that the capital expenditure is too high. In fact, he now charges the Company with having needlessly spent 1½ millions under this head in eight years. He arrives at this figure by taking out the increases in the capital of this Company, the South Metropolitan Company, and the Commercial Company, respectively, during the years 1890-97, and states that, in the case of this Company, the increase was equal to £828 per million of increase of gas sold. This increased expenditure he represents as being the cost of the additions to the plant. His speech admits of no other meaning.

This statement is absolutely misleading and inaccurate. During the period in question, this Company did not spend £828 per million. The true amount was £685 only. But this is not all. Why does Mr. Livesey limit his comparison to these particular eight years? Why does he exclude all reference to the years immediately preceding 1890? Why not embrace in his review the whole period of the governorship of Colonel Makins? Shareholders may find the answers to these questions in the following facts. Between Jan. 1, 1884, and Dec. 31, 1889, the Company spent under £172,000 on capital account, or only £52 per million of increase in gas sales—a figure which it does not suit Mr. Livesey's purpose to quote. But the winter of 1889-1890 showed that there must be large extensions of plant to meet the increase in the business of the Company; for although the percentage of annual increase in the consumption of gas was very moderate, the demand in the cold and foggy weather had overtaken the capacity of the works, and between that time and the close of last year (1897) large and important additions—some of them, such as the new pier and viaducts, of exceptional character—were made, and the Company to-day has again a safe margin of plant in every department.

Within the same period, the automatic prepayment-meter system was introduced—necessitating, as was always anticipated, a very large expenditure of capital.

These were the causes of the large capital outlay in the period selected so adroitly by Mr. Livesey; and it is upon the figures of this exceptional period that he bases his charge of extravagance.

But a more ingenuous critic would have taken as the basis of his calculations the figures for the whole period 1884-1897, and he would then have arrived at the truth of the matter, which is that this Company's capital expenditure was, during that period, at the rate, not of £828 per million, as asserted by Mr. Livesey, but of only £350 per million. This figure compares with the corresponding figures of Mr. Livesey's two Companies, the South Metropolitan and the Crystal Palace District respectively, £315 and £363—see Appendix S.

It would not have been more misleading had some critic of the South Metropolitan Company charged Mr. Livesey with wastefulness and incompetence on the ground that that Company's capital expenditure for the three years 1892-1894 had reached the "extravagant" sum of £540 per million.

Automatic Meter Fittings.

Then, again, Mr. Livesey attacks this Company's expenditure upon prepayment meter supplies [see Appendix Q], stating that the Company "had supplied unnecessarily large meters and stoves, at a cost of £10 per consumer; whereas other Companies had done it for £6." The figure of £10 per consumer given by Mr. Livesey is incorrect, the cost incurred by this Company being under £9 per consumer. As regards the fittings supplied by this Company, they are without ornament, but are strong and well made, with a view to safety against accidents. The stove is of a much better quality, and will be found to be far more durable, than that supplied by the South Metropolitan Company. One special expense this Company has to incur has already been referred to—that of the cost of laying the service, which, in 50 per cent. of these supplies in the North of London, is double the cost of corresponding work in the South of London, on account of the expensive street pavings.

As regards the size of the meter, the Directors are advised by their responsible officer that, for the supply of a stove consuming 30 to 40 feet an hour, a three-light meter, which is certified to pass only 18 feet per hour, is a wholly inadequate and, looking to the provisions of the Sale of Gas Act, possibly *not a legal measure*; also that the systematic over-working of a meter (which must be the result when a three-light meter is fixed where a cooking-stove is to be used) causes it to register "fast," so that the customer has to pay for more gas than he actually consumes. The Directors therefore do not intend to incur the many risks involved in the cheaper system adopted by the South Metropolitan Company.

It will be seen that the reply of the Directors to these reckless charges of Mr. Livesey is not in any sense an apology, but is rather a vindication of the principles upon which the business of this Company has been, and will be, conducted by the Court; and it may be well here to observe that, in the foregoing pages, the Directors have only used such figures as have been obtained from the audited and published accounts of the Companies respectively referred to. These sources of information were equally open to Mr. Livesey; and it is to be regretted that he should have repeatedly committed himself to statements as to the position of this Company which the most ordinary consideration of the authoritative figures would have shown him to be absolutely misleading and inaccurate.

Then followed

The Personal Attack.

Mr. Livesey summed up by stating, quite correctly, that "what he had said was an impeachment of the management," adding that "Colonel Makins had been Governor of the Company for fifteen years. This was quite long enough to make or mar the concern; and he (Mr. Livesey) said deliberately that there was no hope for it, in his opinion, until Colonel Makins gave up the reins." This personal attack renders it necessary that the facts should be plainly stated.

Colonel Makins joined the Board of the late Western Gaslight Company in the summer of 1866; and, at the amalgamation of that Company with The Gaslight and Coke Company, in 1872, he became a Director of the united Company under the Scheme of Amalgamation. Ten years later, he carried a resolution at the Court of Directors, which led to the

amalgamation, in 1883, of the London Gaslight Company with The Gaslight and Coke Company, at the conclusion of which he was elected Governor, to give effect to his policy. And he has, during the subsequent fifteen years, been annually and unanimously re-elected Governor by his colleagues. He has presided at thirty half-yearly meetings; and on every occasion the motion from the chair for the adoption of the Directors' report has been unanimously carried, and the cordial thanks of the meeting have been accorded to the Governor and Court of Directors. Moreover, in 1892, realizing the increasing claims upon his time and attention of this Company and the Great Eastern Railway Company (of which he is the Deputy-Chairman), Colonel Makins retired from Parliament, where he had sat for 18½ years, representing one of the divisions of the county of Essex.

At several of the meetings, Mr. Livesey has made strong attacks on the policy of the Directors, but without support from the proprietors present; and he has never ventured to move a vote of censure or to challenge a division. He has repeatedly reproached the body of shareholders for not agreeing with him, but supporting the Court; and "for taking their dividends and allowing this great concern to go on without any interest being shown in what was being done."

When Colonel Makins was appointed Governor, in 1883, the dividend was at the rate of 11 per cent., and the price of the stock £180 per cent. After fifteen years of, according to Mr. Livesey, baneful performance of his duties, the dividends declared for the past three years have been all at the rate of 12¾ per cent., and the price of the stock when the attack was made was £315 per cent., the charges to the public for gas and meter rental having, during the fifteen years in question, been reduced by 5½d. per 1000 cubic feet, or nearly £500,000 a year.

The Court of Directors.

But the Governor of this Company does not act alone; he is supported by the Deputy-Governor and the other members of the Court.

The Deputy-Governor, Mr. Howard Charles Ward, has been a Director of the Company for 28 years; was previously a Director of the City of London Gas Company; and is Chairman of the Brentford Gas Company and a Director of the Portsea Island Gas Company. Mr. Ulick John Burke has been a Director for 22 years; was previously a Director of the Imperial Gas Company; and is also a Director of the Brentford Gas Company. The Hon. Henry Noel has been a Director for 15 years, and was previously a Director of the London Gaslight Company. Mr. John Aird, M.P., has been a Director for 10 years, and has had very great experience in dealing with gas and water works construction and in the management of labour, both skilled and unskilled. Mr. John Birch Paddon has been a Director for 7 years. He was for many years the Engineer and General Manager of the Brighton and Hove Gas Company, and he is now a Director of that and other Gas Companies. Mr. Corbet Woodall, C.E., who only joined the Court in August last, on the death of Mr. Phillips, has a world-wide reputation for his knowledge of gas-works construction, and is also Chairman of the Tottenham and Edmonton Gas Company.

These gentlemen would seem to form a sufficiently strong governing body, possessing great experience in the conduct of gas undertakings. But, because they have the misfortune not to agree with, and adopt, all Mr. Livesey's personal ideas as to the proper way of managing the Company's business, the Court of Directors is to be "reconstituted," whatever that may mean, and the Governor, whom they have selected annually and unanimously from their own body, is to be sent about his business.

The Secretary and General Manager.

A further strong personal attack was made at the same time by Mr. Livesey on Mr. Field, the Secretary and General Manager of the Company. He says that, five years ago, the Directors were warned not to appoint Mr. Field as successor to Mr. Phillips. By whom? and when? When Mr. Phillips retired, in 1893, he strongly advised the Court to elect Mr. Field as his successor, and they unanimously elected him. No other man was suggested or thought of; and the result has shown that the Company possesses in Mr. Field a most able and competent officer, whose misfortune is that he incurred the hostility of Mr. Livesey by doing his duty to the Company in the matter of the Nine Elms arbitration, which will be dealt with more fully later on. Mr. Field has had 25 years' service in the Company, and is thoroughly acquainted with its history and internal economy.

There is a great difference between the management of this Company and that of the South Metropolitan Company. This is not a "one-man" Company. The Court of Directors decide all questions of policy and principle, and everything except matters of routine. The General Manager carries out the orders of the Court, and focuses the returns of working, &c. He does not manage the technical work of the Company; that is done by the staff of Engineers, who attend the Works Committee at each of its meetings, and advise the Court individually as to their own stations, and collectively as to the general working. In addition to the Engineers of stations, there is also the Consulting and Constructing Engineer, Mr. Trewby, who also attends each meeting of the Works Committee, and advises the Court as to testing and similar matters, and prepares plans and estimates for, and superintends the construction of, new works. There is also the Outdoor Department, under Mr. Foulger, and the Products Department, under Mr. Wilton.

Suggested Disloyalty of the Staff.

Mr. Livesey was kind enough to say that the Company's "staff was as good as those of other Companies," which is quite true; but he added that the officers were not loyal to their leaders, by whom he appeared to mean the Court and General Manager—a statement for which, happily, there is no foundation.

Nine Elms Encroachment.

The Governor, in his reply at the meeting on Feb. 4 last, hinted at the causes of the repeated and persistent attacks to which he and the General Manager had been subjected at the hands of Mr. Livesey; but, in this fuller statement, it is important that the facts should be clearly set out.

In 1886, the South Metropolitan Company invaded the district of this Company by agreeing to give, and giving, a supply of gas to the Nine Elms goods station of the London and South-Western Railway Company, which premises were situated within the district assigned by law to this Company. The supply was sought by the Railway Company on the ground that a discount of 5 per cent. was allowed them by the South Metropolitan Company, which discount the Directors of this Company held, and still hold, themselves precluded by their obligations to the general body of consumers from granting. Of course, no blame attaches to the Railway Company.

The Directors of this Company, as in duty bound, resisted the encroachment, and though, on technical grounds, judgment was given in favour of the South Metropolitan Company by Mr. Justice Kekewich in the first trial, and by the Court of Appeal in the second, the final judgment of the House of Lords was on every point unanimously in favour of this Company. A perpetual injunction, moreover, was obtained by the Company, restraining the action of the South Metropolitan Company; and an account was ordered to be taken of the damages sustained, and the amount which the Arbitrator found to be due was to be refunded to this Company. The Arbitration was held; Mr. H. E. Jones, of the Commercial Gas Company, being the Arbitrator. The Company claimed £7937 as damages. Mr. Livesey stated in evidence that some amount less than £2000 was all that the Company was entitled to claim. The award, however, was £6193, or only £1744 short of the amount claimed. There the matter would, under ordinary circumstances, have ended. But, at the meeting of this Company on Feb. 7, 1890, "a suggestion" was made by a shareholder, and approved by some other shareholders present—though no actual motion was made—that this Company should, in recognition of Mr. Livesey's services to gas companies in general, in connection with the South Metropolitan stokers' strike, forego these damages and let the matter drop.

The Governor explained, at the time, that neither the shareholders nor the Directors had any power to carry out the suggestion. Such action on their part would, in his opinion, have been absolutely illegal, and any single shareholder could have obtained an injunction to restrain them from taking the £6000 odd belonging to the shareholders in this Company and, without any consideration in return, handing it over to the South Metropolitan Company, or, if the Directors had already parted with it, could have sustained an action against them for breach of trust in acting *ultra vires*, and could have obtained repayment *by the Directors* of the money so illegally paid away.

There can, unfortunately, be no doubt whatever as to the existence, on Mr. Livesey's part, of personal animosity towards the Governor and Mr. Field, since he openly avowed it in a letter which he addressed to the late Mr. Phillips, in April, 1893, on his retirement from the position of Secretary and General Manager. This letter, being a private document, is not published in the Appendix; but it is in existence, and can be produced if called for by Mr. Livesey. In this letter, Mr. Livesey stated that whatever he thought about his (Mr. Phillips's) action in the Nine Elms case had been wiped out, and that, as to the Company, all was put right by the expression of sympathy from some of the proprietors present at the meeting in February, 1890; but that he considered that the way in which this Company's Counsel and Mr. Field conducted the arbitration proceedings in question was most bitter, and worthy only of some pettifogging lawyer. He added that, while the Company gained £6000 odd, they lost their good name and also the opportunity of purchasing cordial relations with Mr. Livesey and his Company; and, further, that he could never be on friendly terms with the two men, the Governor and Mr. Field—the former because he had not stopped the action, the latter for his part in the arbitration proceedings.

The whole of the proceedings at the arbitration were reported. They are too long to reprint in the Appendix; but a reference to the report would show that there is no justification for the charges thus brought against the representatives of the Company.

In conclusion, the Court of Directors regret the length of this reply to Mr. Livesey's indictment; but it was obviously right that the fullest answer should be given to charges made on such an occasion as a general meeting of the proprietors, and by one who, though not responsible to them, holds a position in the government of gas industries which cannot be ignored; and the Directors would have been unworthy of that confidence of the proprietors which has always been so freely accorded to them, had they shrunk from dealing in complete detail with the charges so brought forward. The Directors have the best reason to know that the position of the Company is perfectly sound, and that its prospects are good, and fully warrant the high price which the Company's stock commands in the market; and, so long as they enjoy the confidence of the general body of the proprietors, they will continue, as hitherto, to devote their best energies to the advancement of the Company's interests.

For the Court of Directors,

Wm. Thos. Makins, Governor.

Horseferry Road, Westminster, S.W., March 25, 1898.

Appendix A.

Report of Proceedings at the Half-Yearly Ordinary General Meeting of the Proprietors of The Gaslight and Coke Company, held on Friday, Feb. 4, 1898. (*Reprinted from the* "Journal of Gas Lighting," *Feb.* 8, 1898.)

Appendix B.

Extract from Mr. George Livesey's *Letter of Aug.* 6, 1896, *to the* "Journal of Gas Lighting," *published Aug.* 11, 1896.

THE TESTING OF LONDON GAS.

The point of the matter, however, is: What is the intention of Parliament, or what is the meaning of the testing clauses in all Gas Acts? In dealing with this point, Mr. Dibdin has confused the question, but certainly has not proved that, when Parliament prescribes (say) 16 candles at certain specified testing-places, 16 candles at the consumers' burners is intended. It was made quite clear to Parliament in 1860, and probably earlier, that gas loses appreciably in travelling from the works to the consumers; and with this knowledge, the positions of the testing-places have been fixed. When an intermediate position is prescribed, it is in order that a portion of the loss shall be borne by the manufacturer, leaving the remainder to be sustained by the consumer. When testing at the works is specified, the consumer bears it all; but this is allowed

for in the number of candles prescribed—say, 15 at the works takes the place of 14 a mile away, or in about that proportion. Consequently, the consumer loses nothing it was intended he should have; the loss referred to being thus only apparent.

APPENDIX C.

Extract from Mr. GEORGE LIVESEY'S *Letter of July* 3, 1896, *to the* "JOURNAL OF GAS LIGHTING," *published July* 7, 1896.

THE TESTING OF LONDON GAS.

As far back as I can remember, it has been known that gas loses more or less, according to circumstances and temperature, by travelling. . . . Dr. Letheby, the Official Gas Examiner for the Great Central Company's gas, stated, in evidence before the Parliamentary Committee on the Metropolis Gas Bill of 1860, that he found there was a loss of almost exactly two candles in travelling through the three miles of trunk-main between the works and the City, of which the greater part was lost in the first 1½ miles. This, no doubt, is the reason why the Act of 1860 prescribes 1000 yards, as near as may be, from the works as the position of the testing-place. This is repeated in the Acts of 1868 and 1869, with the addition of the words "not less than" 1000 yards; but then came the difficulty of Beckton. Objection was made to the 1000 yards limit. In 1876, it was repealed; and the fixing of the positions of the testing-places was left to the Gas Referees. *These gentlemen have, as far as possible, or practicable, acted on the principle of the Acts of* 1860, 1868, *and* 1869. *They have, in our case at any rate—and I believe, as far as the conditions of Beckton permit, generally have—prescribed a testing-place for each manufacturing station, and have placed it on a leading main as near as may be, but not less than,* 1000 *yards from the works.* I was glad to hear Mr. Harcourt's corroboration of this principle in his evidence in the Dublin case. I therefore contend that London gas is to be of 16-candle power, when tested by samples taken from the bulk from leading mains, in accordance with the intention of Parliament, as carried out in practice by the Gas Referees. If Parliament had intended the quality to be 16 candles at the consumers' burners, it would have said so; and the consumer would have had to pay for it—much more, indeed, than the extra quality was worth.

[*Note.*—The italics are not in the original. They are now used to draw attention to the serious inaccuracy of the writer in his remarks upon the testing of Beckton gas. The facts are that there are six testing-places for gas manufactured at Beckton, and that the one nearest to Beckton is 7½ miles distant therefrom, while the most remote one is 10½ miles distant from Beckton.]

APPENDIX D.

Extract from Report by the Chemist to the London County Council on the Existing Arrangements for Testing Gas.

CHEMICAL AND GAS DEPARTMENT,
40, CRAVEN STREET, W.C.
8th June, 1894.

From the foregoing it appears that the 53 millions of cubic feet of gas made daily by The Gaslight and Coke Company is tested at fifteen stations, that the 36 millions of cubic feet made by the South Metropolitan Gas Company is tested at six stations, and the 5½ millions of cubic feet of gas made by the Commercial Gas Company is tested at two stations. The ratio of gas made to testing stations is therefore—

Gaslight and Coke Company. . .	3½ millions.
South Metropolitan	6 ,,
Commercial	2¾ ,,

From these results it would seem that, make for make, the gas supplied by The Gaslight and Coke Company and the Commercial Gas Company is equally tested, but that the gas supplied by the South Metropolitan Gas Company is most inadequately examined. Undoubtedly this is so.

APPENDIX E.

Extract from Mr. GEORGE LIVESEY'S *Letter of Aug.* 27, 1892, *to the* "JOURNAL OF GAS LIGHTING," *published Aug.* 30, 1892.

ANTHRACENE.

There is, I am assured, no reason whatever but one why anthracene should not be sold at the present time at 2s. 6d. per unit, or more. It is only necessary for half-a-dozen of the leading tar distillers to agree to have a higher price, and it can be obtained; and all but one are ready to bring about such agreement, when the price could go up at once. For instance, instead of putting or forcing it upon the market, could not the makers, by common consent, wait for buyers to come to them? Or, if this is not advisable or practicable (though no difficulty is apparent), could they not sell it by tender; fixing a minimum price, just as the gas companies sell their stock under the auction clauses—the minimum, of course, to be above the absurdly low price now quoted? It may be said that this would not succeed. But anthracene is undoubtedly worth more; and if those who want it know it cannot be obtained at less than a certain price, they will pay more, just as with the last issue of our "C" stock. The market quotation was £232; we put the reserve price at £240, and sold it all with a little patience. The case of anthracene is much stronger than that; and probably other tar products are in a somewhat similar position.

Extract from Mr. GEORGE LIVESEY'S *Letter of* Oct. 7, 1892, *to the* "JOURNAL OF GAS LIGHTING," *published Oct.* 11, 1892.

ANTHRACENE.

I was informed that the stock of anthracene in the hands of tar distillers in this country is very low. I now, however, hear that practically the only stock of any importance is that held by the Chartered Company; and the fear is that that Company will again force a sale of their stock on an unwilling market, with the result of further depressing the price. I said to my informant: "But what would you have the Chartered do?" His reply was prompt, to the effect that the tar distillers would be quite willing to carry the stock jointly with the Company until the market is ready to receive it. All, therefore, that seems to be necessary is for the Company to confer, and come to an agreement with the tar distillers—in number a very small body of men—and thus, by united action, put an end to their exploitation by the foreign colour makers, who are realizing such large profits.

APPENDIX F.

Extract from Mr. GEORGE LIVESEY'S *Speech at the General Meeting of The Gaslight and Coke Company, Feb.* 7, 1896, *as reported in the* "JOURNAL OF GAS LIGHTING," *Feb.* 11, 1896.

With regard to the fourth paragraph in the report, he thought it contained some words which were rather misleading. It was said that "the Board of Trade returns show that the cement manufacturers, who are considerable buyers of the Company's coke, are participating very largely in the marked improvement which has taken place in the general export trade of the country." This was certainly true, but was only partly true. The cement manufacturers were participating in the increased quantity sold; but they were not benefited by any increase in value. In December last, taking the Board of Trade returns, the increase in the quantity of cement exported was 26·3 per cent.; and the increase in value was 26·4 per cent.—showing that, while the manufacturers were largely increasing their business, their profits were not increasing.

. . . . . .

The Company had a highly respected and worthy officer, who had managed their coke business for a great many years; but when September came, instead of letting this gentleman negotiate, and thus follow their usual course, the Directors advertised for tenders. If any man could blame the cement makers for combining, remembering what they had suffered at the hands of the Directors of this Company, he was not that man.

APPENDIX G.

Extract from Mr. GEORGE LIVESEY'S *Speech at the General Meeting of the South Metropolitan Gas Company, Feb.* 14, 1894, *as reported in the* "JOURNAL OF GAS LIGHTING," *Feb.* 20, 1894.

The coal combination which appeared to have been just started—started, too, for the purpose of forcing up the price of gas coal—was a combination they would do their utmost to defeat. He had written to the Company's coal agents to inform the contractors that, if they chose to go into a combination of this kind, it would be regarded as an indication that they did not value the old connection of so many years, and that if they "put the screw on" the Company in such an unfair way, it would be they and not the Company who broke the connection. He did not think, however, that the combination would last long; and he believed that they would find means of circumventing it.

APPENDIX H.

Extract from Mr. GEORGE LIVESEY'S *Speech at the General Meeting of the South Metropolitan Gas Company, Feb.* 16, 1898, *as reported in the* "JOURNAL OF GAS LIGHTING," *Feb.* 22, 1898.

But what was really wanted was stated in the report: "Some of the causes of the fluctuations are beyond control, but others could be dealt with if the leading gas undertakings would act together." They had thought of inserting in the report, when drafting it, these additional words: "Surely with the prospect, if the present disunion continues, of tar becoming almost valueless on the one hand, and on the other its restoration by co-operation to a price approximate to its real value, such co-operation should not be regarded as impossible of attainment." He believed that it would be possible, by reasonable co-operation among gas manufacturers, to restore tar to something approaching its proper value. When anthracene was first discovered, tar went up from 1d. to 4d. a gallon; and tar products had enormously increased in value since that time. If they could get 4d. a gallon for tar, they would be able to reduce the price of gas by 3d. per 1000 cubic feet, and sell it at 2s. per 1000 cubic feet. If they could get 3d. a gallon, it would enable them to take 2d. per 1000 cubic feet off the price of gas. What was the obstacle to this co-operation? The London make was sufficient almost to control the business; and he was quite certain that the large producers of tar throughout the kingdom, as well as some of the foreign gas companies, would be quite ready to join with them in protecting themselves against the serious loss now sustained by throwing away the tar for next to nothing. The Gaslight and Coke Company used last year 2,060,000 tons of coal; and the South Metropolitan Company, 947,000 tons. If these two Companies could work together, the thing would be done.

Extract from Mr. GEORGE LIVESEY'S *Speech at the General Meeting of the Crystal Palace District Gas Company, Feb.* 18, 1898, *as reported in the* "JOURNAL OF GAS LIGHTING," *Feb.* 22, 1898.

He had spoken in another place about coke, showing how, by the accumulation of large stocks (this Company never accumulated stocks), the market price had been depressed—unduly and unnaturally depressed; and it took a long time to recover from such depression. He had also on another occasion spoken about tar; but he would deal now more particularly with sulphate of ammonia. About Midsummer, 1894, sulphate was selling at £13 15s. per ton. The largest makers were not satisfied with this, and asked for £14. The market would not give it; £13 15s. being an extremely good price. The people who wanted the higher price accumulated a stock of some thousands of tons; and in October they had to sell it at £13. They again went on accumulating a considerable stock, and held out against the market. By the end of December, another large stock was on hand; and they then had to sell at £11. So, on and on, the market went down from £13 15s. to £7 or so. When he told the proprietors that £7 per ton was quite an unprecedented price, and moreover it was lower per ton than the price of nitrate of soda, and when it was remembered that the latter was worth in its ammonia value £2 per ton less than sulphate of ammonia, they would at once see that for sulphate to go below the price of nitrate was a most extraordinary circumstance; and he attributed it entirely to the accumulation of these large stocks. The stocks were on hand; and in time the buyers of sulphate came to know, or they had the feeling, that these stocks might be thrown on the market at any moment, and that if they committed themselves in any way they might be losers. Instead of having gone below £7 per ton, sulphate ought not to have fallen lower than £9. However, as soon as the stocks had all gone—this was a few months ago—the price immediately began to rise; and it had gone up about £3 (from £7 to £10), in six or seven months.

Appendix I.

Extract from Mr. George Livesey's *Letter of Feb.* 22, 1896, *to the* "Journal of Gas Lighting," *published Feb.* 25, 1896.

THE GASLIGHT AND COKE COMPANY AND THE SOUTH METROPOLITAN GAS COMPANY AND THEIR COKE.

I think the position of the cement makers is an arduous and an anxious one. Their very existence is seriously threatened by bounty-fed foreign competition; and for patriotic Englishmen to help the foreigner by selling him coke at a lower price than to their own countrymen and neighbours is nothing short of an outrage. Whatever its sins, the South Metropolitan Company has never done this. The price of cement has consequently ruled very low for some years; and the present revival of trade, although increasing the demand for cement, has so far not increased the price. In addition to this very serious difficulty, they have the constant anxiety about their supplies of fuel, as fuel accounts for one-third of the cost of making cement. This anxiety is of two kinds—the price to be paid, and the uncertainty as to the quantity obtainable. Mr. Bevan tells us this latter point is so serious that it led him to offer the high price in 1894; and by that desperate move he has succeeded in obtaining such a large stock that all present anxiety on this score is removed.

. . . . . .

The cement makers truly say that, before the amalgamations of the London Gas Companies, they were able to buy coke cheap—too cheap, I think; and that was one reason why, on our absorption of the Phœnix and the Surrey Companies in 1880, we gave special attention to the development of the local trade, following the policy of the old South Metropolitan Company. The effect of these amalgamations has been just the same as a combination among the Gas Companies, though there is no friendly co-operation between them. This practical monopoly, and concentration of the wholesale coke trade, it may be said, almost in the hands of two Companies (for the Commercial sell very little to the cement makers), fully justifies their action in at last combining to protect themselves, and to obtain relief from their difficulties in regard to their supplies and the price of coke.

Appendix J.

Extract from Mr. George Livesey's *Speech at the General Meeting of The Gaslight and Coke Company, Feb.* 5, 1897, *as reported in the* "Journal of Gas Lighting," *Feb.* 9, 1897.

If the Governor met with gas managers, as he himself did, he would know that this was a universal complaint. When the name of the Chartered Company was mentioned, they said that it was the curse of the products' trade, both as to ammonia and coke. This was rather a strong statement; and he felt bound to justify it. In 1894, one of the largest cement makers came and offered an extraordinary price (12s. 6d. per ton) for coke; but the Chartered Company thought they would do better, and forced the price up to 13s. 6d. a ton—an outrageous figure, which the cement makers had to pay. In 1895, they were determined that they would give nothing like that price; and by forcing them up to 13s. 6d. a ton, the Chartered Company forced them into combination. In 1895, instead of pursuing their usual policy, and negotiating in a friendly way with these gentlemen, as had been done successfully for many years, the Chartered Company determined to adopt a new policy with respect to cement makers' contracts, and asked for tenders.

Appendix K.

The Gaslight and Coke Company and South Metropolitan Gas Company.

Comparative Statement of the Totals of Reserve Fund and Undivided Balance of the Two Companies for the Years 1888–1897.

The Gaslight and Coke Company.		South Metropolitan Gas Company.	
1888	£807,399	1888	£254,414
1889	715,878	1889	198,838
1890	385,700	1890	114,449
1891	115,244	1891	37,788
1892	119,668	1892	51,076
1893	184,569	1893	68,419
1894	380,954	1894	95,208
1895	293,130	1895	101,726
1896	178,105	1896	94,628
1897	48,484	1897	96,675

Appendix L.

Extract from Mr. George Livesey's *Speech at the General Meeting of the South Metropolitan Gas Company, Aug.* 19, 1891, *as reported in the* "Journal of Gas Lighting," *Aug.* 25, 1891.

This brought him to the subject of the increase in the price which they proposed to charge from Michaelmas next. He had met several shareholders since the report was sent out, and they had expressed satisfaction at the paragraph in which the announcement of an increase was made. One shareholder had said he was very glad that the Directors had advanced the price, to which he had himself replied that he was very sorry. Another shareholder said: "I am glad you have raised the price of gas. But you have done a right thing at the wrong time. You ought to have raised it two years ago." He (the Chairman) disputed this. He contended that to have raised the price two years ago would have been a great mistake. The only argument which had been used in favour of increasing the price two years ago was this: It was said, "If you had raised the price immediately after the great increase in the cost of labour and of coal, the public would have expected it, and would have taken it as a matter of course. Now coal is going down somewhat, and the public will be far less pleased with you than if you had raised the price two years ago." He disputed this altogether. In the first place, he objected to the argument, which was based on the ignorance of the public; and it was assumed that the Company might take advantage of this ignorance. Having funds in hand to enable them to carry on their business, it was assumed simply because of the accidental circumstance of an advance in the price of coal, which had its effect on the public mind, that the Company ought to have availed themselves of this and to have raised the price of gas. He would rather let the public see that they continued to act fairly towards them. A day or two since he met a gentleman who was connected with one of the leading newspapers, who said to him about this matter: "The public know, Mr. Livesey, that you will never raise your price until it is absolutely necessary to do so." This, he contended, was the right and proper principle; and it was the principle that was most in the interests of the Company. If they were to raise the price whenever there was the smallest excuse for it, they would be playing into the hands of their enemies; whereas if they showed the public that they were willing to use up their reserves and to forego a considerable amount of dividend (the £50,000 he had mentioned) rather than raise the price of gas, they would maintain the position they held in the public estimation—a position of which they were very proud. They felt that the public regarded them as honest traders, who would deal fairly by them; and they contended that, by acting as they had, they had done their best to maintain this character. It might be asked why they had delayed raising the price. His reply was, "Simply because it had not been necessary to raise it before; and they hoped that they might have tided over the period of high-priced coal without raising the price at all."

Appendix M.

Extract from Minutes of Proceedings taken before the Commissioners appointed by the Board of Trade to Revise the Scale of Illuminating Power and Price of the Gas Supplied by The (Chartered) Gaslight and Coke Company.

21*st March*, 1874.

Mr. G. T. Livesey (in answer to the Chairman):—

Question 3191.—How is it that your Company does not charge meter-rents? What is the history of that?

Answer.—We felt it was a very obnoxious and objectionable charge, and that it would be far better to include our charges to the consumer under one sum for gas rather than have a petty 1s. or 1s. 6d. a quarter added to their bills for meter-rents.

Question 3192.—If you were establishing a new company, would you advise that meter-rents should not be charged, being perfectly free in the matter?

Answer.—Undoubtedly I would.

Appendix N.

Extract from Mr. George Livesey's *Speech at the General Meeting of The Gaslight and Coke Company, Aug.* 3, 1894, *as reported in the* "Journal of Gas Lighting," *Aug.* 7, 1894.

The Governor, in reply, said he was thankful and grateful to Mr. Livesey for attending the meeting, and stating his grievance. The first remark made by Mr. Livesey was that the Chartered Company, in the matter of meter-rents, had lost their "tail" in the City. But Mr. Livesey had no tail at all in 1876, for he never charged meter-rents at that time. The Chairman of the House of Commons Committee asked why meter-rents were not charged by him; and Mr. Livesey replied that it was a very obnoxious and objectionable charge, and that they had better not have it.

Mr. Livesey admitted that this was quite true; and, under similar circumstances, he would say it again. But this was before the sliding-scale came into operation. The Chartered Company had 3s. 9d. as their initial price; and the South Metropolitan Company thought they had been unfairly treated in being put at 3s. 6d. Directly they got their Act of Parliament, they said: "They have treated us so unfairly that we will take advantage of what the Act gives us. We will put on meter-rents, and this will enable us to reduce our price by 1d., and get an extra ¼ per cent. dividend."

Appendix O.

Extract from Mr. George Livesey's *Speech at the General Meeting of The Gaslight and Coke Company, Feb.* 8, 1884, *as reported in the* "Journal of Gas Lighting" *of Feb.* 12, 1884.

I think, in relation to the dividend, that the time is fast coming when it should be increased. These additions to the reserve fund are simply taking money out of the pockets of the present owners, to give it to posterity; and the object of the sliding-scale is thus defeated. It was intended that the prospect of an increase of dividend should make shareholders anxious to reduce the price of gas. If the dividend is not to be increased, this stimulating motive is taken away.

Appendix P.

Extract from Mr. George Livesey's *Speech at the General Meeting of The Gaslight and Coke Company, Feb.* 11, 1887, *as reported in the* "Journal of Gas Lighting," *Feb.* 15, 1887.

You have charged a considerable amount to depreciation of capital; but I am not quite clear whether it is legal to do so. I am not aware of any Act of Parliament whereby gas companies can depreciate their capital. Although it may be a wise thing to do under certain circumstances, it cannot be right under the circumstances in which this Company is now placed. If these sums had not been charged against revenue which might have been charged against capital (£18,000 last half year) and if you had charged to capital the legitimate amounts that should have gone to capital—the extensions of mains and works—I believe there probably would have been a difference of between £50,000 and £60,000. For instance, this great Company last half year charged £8292 on extensions of mains and meters, which is a ridiculous sum for a large Company like this. A vastly larger amount must have been spent.

Appendix Q.

Extract from the Report of the Distributing Engineer of The Gaslight and Coke Company on the Subject of Fittings for Automatic Supplies.

23*rd February*, 1898.

Complaint was more particularly made of extravagance in the size of our slot meters. A 3-light meter as used by the South Metropolitan Company is rated to pass 18 cubic feet only per hour; and they fix a stove which requires from 30 to 40 cubic feet per hour to itself while working.

It is necessary now to refer to the Sale of Gas Act, 1859, and call attention to the proviso in clause 16 of that Act:—

Provided that the gas to be consumed per hour shall not exceed the quantity per hour the meter is intended to measure, so marked on the outside thereof as aforesaid.

It is an established fact that an overworked meter registers against the consumer. An enforcement of the clause quoted would be disastrous to any company which had looked no further ahead than the small saving between the original cost of a 3-light and 5-light meter, and, inasmuch as it would imply wholesale condemnation of the lot, I take all responsibility for advising the Court as I did to use 5-light meters.

In addition, a 5-light meter, worked at its normal rate or thereabouts, will last double the time of a 3-light meter which is forced to double its normal rate; while the question of fair wear and tear under the maker's five-years' periodical guarantee will probably arise in regard to the overworked 3-light meters.

The principal monetary difference is in the cost of the *service*, and is wholly due to the very expensive nature of the paving now so general over nearly the whole of our district, and is quite beyond our control, as by statute we are compelled to repair with the same or similar material.

Having regard to the liability in reference to fitting up houses, both as to the safety of life and property, I have always presumed that the Court desired me to put in the very best description of work, and in no way to sacrifice efficiency to so-called economy.

Appendix R.

The Metropolitan Companies and the Crystal Palace District Company.

Increase and Decrease in Charges for Gas and Meter Rental per Thousand. 1883–1897.

Year.	The Gaslight and Coke.	South Metropolitan.	Commercial.	Crystal Palace.
	s. d.	s. d.	s. d.	s. d.
1883 . . .	3 2·6	2 10·4	2 10·6	3 1·3
1884 . . .	3 0·7	2 8·3	2 8·7	2 11·4
1885 . . .	3 0·6	2 8·4	2 8·7	2 10·6
1886 . . .	3 0·5	2 6·4	2 7·3	2 9·8
1887 . . .	3 0·4	2 5·6	2 6·7	2 9·5
1888 . . .	2 9·4	2 5·4	2 6·6	2 9·1
1889 . . .	2 6·6	2 3·4	2 5·1	2 7·5
1890 . . .	2 8·1	2 3·4	2 4·5	2 6·4
1891 . . .	2 9·5	2 4·3	2 4·5	2 6·4
1892 . . .	3 1·1	2 6·2	2 6·7	2 8·3
1893 . . .	3 0·8	2 5·5	2 9·2	2 9·1
1894 . . .	2 11·8	2 4·7	2 7·4	2 8·7
1895 . . .	2 9·4	2 4·0	2 6·5	2 7·9
1896 . . .	2 9·3	2 3·6	2 6·6	2 7·3
1897 . . .	2 9·3	2 3·6	2 6·7	2 7·4
Reduction as compared with 1883.	d. 5·3	d. 6·8	d. 3·9	d. 5·9

Appendix S.

The Metropolitan Companies and the Crystal Palace District Company.

Amount of Capital Expended and Raised, per Million Cubic Feet of Increase in the Gas Sales for the Period 1884–1897.

Period.	Company.	Total Expended.	Per Million.	Total Raised During the Period.	Per Million.
Jan. 1, 1884, to—					
Dec. 31, 1889 .	Gaslight and Coke.	£171,596	£52	£41,728*	£13*
,,	South Metropolitan	562,613	384	576,986	394
,,	Commercial . .	116,175	382	75,873	249
,,	Crystal Palace . .	42,629	229	38,709	208
Jan. 1, 1890, to—					
Dec. 31, 1897 .	Gaslight and Coke.	£1,998,842	£685	£2,414,902	£828
,,	South Metropolitan	902,896	282	950,573	298
June 30, 1897 .	Commercial . .	111,310	282	121,074	307
Dec. 31, 1897 .	Crystal Palace . .	120,441	458	122,514	466
Jan. 1, 1884, to—					
Dec. 31, 1897 .	Gaslight and Coke.	£2,170,438	£350	£2,373,174	£383
,,	South Metropolitan	1,465,509	315	1,527,559	328
June 30, 1897 .	Commercial . .	227,485	326	196,947	282
Dec. 31, 1897 .	Crystal Palace . .	163,070	363	161,223	359

* Reduction.

San Paulo Gas Company, Limited.—At the general meeting of this Company to be held on the 25th inst., the Directors will recommend the payment of a dividend at the rate of 10 per cent. per annum in respect of the past year.

Northampton Water Supply.—The Northampton Town Council yesterday week voted £5500 for the construction of new filter-beds according to plans prepared by Mr. John Eunson. It is proposed to augment the present filtering power by 50 per cent.

Differential Discounts on Gas Accounts at Belfast.—The Belfast Corporation have passed a resolution instructing the Law Committee "to promote forthwith a Bill in Parliament with the object of repealing so much of the Local Act as authorizes the allowing of differential discounts off gas accounts, and substituting therefor power to the Corporation to allow such uniform discount on all accounts paid within the month immediately after the close of the quarter as the Corporation may from time to time determine."

COMMERCIAL GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Thursday, at the Cannon Street Hotel—Mr. John Blacket Gill in the chair.

The Secretary (Mr. H. D. Ellis) having read the notice convening the meeting,

The Chairman, in affixing the seal to the register of proprietors, remarked that they now numbered 1419, which was a large increase on what the figure used to be. Proceeding to move the adoption of the report and accounts (*ante*, p. 778), he said he was sorry that, probably owing to the inconvenience of the day, there was rather a poor attendance. But they worked according to their Act of Parliament; and as he thought the proprietors would be pleased to have their dividends as soon as possible, the Directors decided not to postpone the meeting for a week. He believed they would agree with him that the report and accounts were satisfactory. He had no doubt they had noticed that a good many chairmen of gas companies had complained that the mildness of the winter had lessened their receipts. He supposed he might say that the mildness of the winter and the engineers' strike (for a good many of those misguided individuals lived in their district) had also diminished their receipts in the past half year; but, inasmuch as they were able to show an increase of 4 per cent., he thought they must regard this as fairly satisfactory. Their residual products had not served them well; they were decidedly bad. As the proprietors were aware, they were surrounded on all sides by a very large and powerful Company; and any policy that Company chose to pursue in relation to their residuals sometimes acted upon them (the Commercial Company) in an unfortunate manner. He was pleased to say the policy of that Company as lately declared did not act upon them—that was in regard to the increase in the price of gas. He was glad of this opportunity of mentioning it, because he knew it had been stated in the East-end that the Commercial Company were bound soon to follow the suit of The Gaslight and Coke Company, and raise their price. He could assure the proprietors that the Directors had no idea of doing so; and he might add that they were all firmly convinced that the soundest foundation upon which to build the prosperity of a Company like their own was to supply gas at as low a figure as they possibly could. Therefore he would say again they had no idea, at the present time, of raising the price of gas. In reference to this subject, he should like to make a few remarks upon some figures which Mr. Ellis had taken the trouble to calculate. In 1875, the Company secured the Act under which they now worked, and in that year also they obtained the sliding-scale. At the time they were receiving 3s. 9d. per 1000 cubic feet for gas, and were paying 10 per cent. dividend. Commencing in June, 1877, when they first reduced the price of gas, to the end of December, 1897, the total reduction in favour of the consumers represented £1,965,389; and the total dividends paid in excess of the standard rate was £396,783. People often spoke of the partnership existing between gas proprietors and consumers; but he thought it would be agreed that the consumers in their district had been receiving the best of the partnership. The proportionate advantage to consumers was 5, and to shareholders 1. The consumers were really even better off than this indicated; for the greatest reductions in the price were made at the periods of the largest sales of gas. Had the Company not been tied down by the restrictions put upon them in the shape of illuminating power (they had to provide gas with a much greater illuminating quality than was absolutely necessary), the consumers would have saved many thousands of pounds more. He thought the proprietors would agree with him that these figures were interesting and suggestive, showing as they did that the working of the sliding-scale had really been of great benefit not only to the shareholders of gas companies but to the gas consumers. The Directors had spent a considerable amount of capital during the past half year; and in one direction especially, the expenditure had given them much satisfaction—that was, the money they had spent upon an acid plant. He believed he mentioned at the last meeting that certain people had complained of the exhalations at one of the stations; and the consequence was their Engineer (Mr. H. E. Jones) determined to put up an acid plant, which had worked in a very satisfactory manner. By its means, they got rid of the cause of the trouble, and at the same time manufactured sulphuric acid, which was useful to them, and which in the long run would pay them very well. Another considerable item of capital expenditure was, of course, for coin meters. He believed they had spent between £30,000 and £40,000 on them; and that the number fixed was at present 8000. He always looked upon this branch of their business with considerable satisfaction, as he felt that, while they were doing something for themselves, they were conferring a great boon upon the working people in their district. They had started this coin-meter business on a thoroughly satisfactory basis; and he had no doubt that by-and-bye, by putting a certain sum to depreciation every year, the capital would be redeemed, so that the Company would be in a better position in this respect a few years hence than at present. It must be remembered in this connection that the Company were rather handicapped, because their capital cost them a considerably higher rate than it did their neighbours. Regarding gas-stoves, an additional 818 had been fixed. He had heard that the electricians were making a sort of a move in the Company's district; but he had not much fear of the result, because he thought theirs was too poor a district for the electricians to make much out of. Some of the Vestries, however, had been taking steps to obtain Provisional Orders; but he should not be at all surprised if, by-and-bye, they found that they had made a mistake. Anyway the Company had nothing to fear at the present time from that quarter. As to the accounts, he would not weary the proprietors with many figures. They had paid £3680 more for their coal; but they had received £6585 more for gas, and meter-rentals had increased by £1048. The receipts for coke were £1867 less; and for tar (which had been a great drug), £2325 less. Sulphate of ammonia had realized £367 more; but this compared with a very bad time. To pay the dividends, they would have to use the balance of the undivided profits (£1582). The earnings amounted to £47,910; and this sum, together with £297 received for interest and the undivided profits, made £49,789. From this they had to pay their debenture interest of £4501; making a total of £45,288. But as they required £47,459 for their dividends of 13½ and 10½ per cent.

respectively, they must take £2172 from the reserve fund. He was sorry they had not been able to quite make both ends meet. But the amount to be taken from the reserve fund was a modest one; and there were good reasons why they could draw the sum required from this source. In the first place, they were paying upon considerably more capital than they were this time last year; and, secondly, the proprietors would be glad to know that the deficiency was not attributable to any falling off in the business. On the contrary, during the past month, the Engineer had reported that there were considerable increases in the consumption of gas. The deficiency was wholly caused by the market for residuals, over which the Directors had no control. The receipts for residuals in the past half year were £3824 less than in 1896; so that, if this had not been so, they would not have had to have recourse to the reserve fund. He hoped the value of residuals would soon improve, so that they would be able to make both ends meet. The works were all in thoroughly good working order; and everything was going on satisfactorily. Therefore, he thought they might look forward with hope to the present half year.

The Deputy-Chairman (Mr. W. G. Bradshaw) seconded the motion.

Mr. Ennis remarked that the Chairman had made a useful and interesting statement; and he was particularly pleased to hear the figures which had been introduced by Mr. Ellis. He was sure these figures would stand the Company in good stead before a Parliamentary Committee or in some other relation. He noticed from the balance-sheet that there was an amount of £66,667 invested in Consols. It was a very comfortable thing to have such a large item in Consols; and it was a very conservative policy. But at the same time it seemed to him that it was the nature of a "panicky" investment to put so much money in Consols at their present price. It was quite possible to do better than this—to get first-rate securities paying 5 per cent. He did not say they were on a par with Consols; but there were good securities, the interest on which would have saved the Directors dipping into the reserve fund or the undivided profits. He certainly thought something better might be done, though he would not say they would secure quite 5 per cent.; but something like 3½ or 4 per cent. could be had.

Mr. Baddeley remarked that it was hardly fair of Mr. Ennis to withhold from them where these good securities could be obtained. He had quite made their mouths water. (Laughter.)

The Chairman, in reply, said that the Consols cost them £95 2s. 8d. per cent. Under their Act, they were bound to put the reserve fund into Government or other securities of a like nature. He wished to add to his previous remarks as to the consumption of gas that the increase in the half year was 4 per cent.; while in the preceding half year, it was 11 per cent. In the Engineer's report, he found that of the total increase of 52,732,000 cubic feet, 19,165,000 feet was attributable to the increase in the coin meters; the remainder being due to the revival of trade in the district, which was shown in every form by the rentals and collections.

The motion was unanimously carried.

On the proposition of the Chairman, seconded by the Deputy-Chairman, dividends at the rate of 13½ per cent. per annum on the old stock and 10½ per cent. on the new stock, less income-tax, were declared.

The retiring Directors (Sir J. Colomb and Mr. J. G. Pilcher) and Auditor (Mr. G. Isley) were re-elected.

The proceedings concluded with votes of thanks to the Chairman and Directors, and to the Engineer (Mr. H. E. Jones), the Secretary (Mr. H. D. Ellis), the Accountant (Mr. Favatt), and their respective staffs.

EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly General Assembly of the Proprietors was held at the offices, St. Helen's Place, Bishopsgate, on Thursday last—Mr. George Banbury presiding.

The Secretary (Mr. I. A. Crookenden) read the notice convening the meeting; and the report of the Directors was taken as read.

The Chairman thought they might truly say that the results of their working for the past six months had been satisfactory to their consumers, to their shareholders, and to members of the Board. They had—to put matters concisely—had no drought, no frost, no parliamentary worries; and a larger amount of revenue had come to their credit than in any previous half year since the Company was founded. Comparing the past half-year's figures with those of the corresponding period of 1896, they found an increase of revenue amounting to £10,710, which brought up their total increase for last year to just £15,000, and showed clearly enough that, as regarded expansion of their undertaking, they were certainly "Progressives." Their revenue had been collected with less unavoidable deductions than usual; and when they found that the sum written off for bad debts amounted to only £393 out of a total rent-roll of £156,000, they might fairly say that both their customers and their collectors had been most business-like and punctual. There was also an increase in meter-rental, owing to new supplies and to a larger consumption by those already existing. He remembered once, when speaking of a decrease under this head, saying: "We are, to a large extent, a trading Company; and therefore our income must vary with the inevitable fluctuation in the state and prospects of business." So that, should the latter continue to improve, a still further increase in the meter returns might certainly be looked for. During the past half year, including additional meters, water had been laid on to 2645 new tenements. These, as was invariably the case now-a-days, were mostly situated east of the River Lea, or outside the Metropolitan area. The new comers paid them on the average £1 4s. 10¾d. per house, which was 10½d. per house more than was paid by their predecessors in 1896. This increase might seem insignificant; but it was not so, as an increase of 1s. per house represented an additional ¼ per cent. to dividend. At present their average charge per house was just over £1; but there was every reason to believe that the improvement just mentioned would be well maintained, as houses of a better kind were being built upon some of the new estates. For instance, in the neighbourhood of Ilford, there were the Manor Park and the Cranbrook Park estates, on which good double-fronted houses were being built, which would return the Company a higher rate. When saying that the average income per house was just over £1, it of course included those of the best class; but the water-rates of the poorer tenements, which were so numerous in their district, came out so low that they found they were supplying 600,000 people at something under ½d. per head per week. If these recipients were under the impression that a change in the system of the Metropolitan Water Supply would still further reduce the charges, they were only too likely to find, as experience had shown elsewhere, that the result would be just in the opposite direction. Nevertheless, there was no doubt an impression abroad that the transfer of the Company to a municipal body would somehow diminish, if not altogether abolish, the rate now paid by the poorer classes. But the new municipal body could hardly dispose of its water for less than 5d. per 1000 gallons—the rate received by the Company over the whole of their district. This was the lowest of any Metropolitan Company, and below that of Corporations like Manchester, Liverpool, Birmingham, Leeds, and Nottingham. Putting it in another way, 5d. per 1000 gallons came to about 1d. per ton, which could not be deemed dear for water brought from a long distance, stored, filtered, and lifted up to the tops of the houses. They were, moreover, paying back to the consumers 10 per cent. of this sum in alleviation of local rates, as their payment to these cesses was £33,000 per annum, or just one-tenth of their income. In connection with this subject, he quoted the following extract from a recent article in "The Times"—remarking that the last part of the extract was somewhat important: "It appears from this table that consumers occupying houses of low and medium rateable value enjoy a considerable advantage in London; and that holds good generally with regard to other provincial towns besides the three given above. In other words, municipal authorities impose a relatively heavier burden on persons of small and moderate income than the London Water Companies—a somewhat singular result of popular government." It seemed, therefore, tolerably apparent that what with the conditions of the water supply being more strictly enforced under a public body as regarded fittings, waste, &c., and what with an initial general rate upon property and persons who never paid anything before, the East Londoners might find that they were worse off than they were under the Company, whom, as the rate-collector, they did not regard with favour. Dislike to making payments to a trading body was no doubt very general; but it was somewhat unjust, as had it not been for the energy and perseverance of this Company, which had hard struggles financially and otherwise in its earlier years, the water supply in the East-end would have remained in a very primitive condition. People sometimes said: "Oh, but owing to your scale of charges your £100 house in the East-end pays more for water than £100 at the West-end." But they clearly forgot that the latter would be rated far higher; and thus pay much more to its Water Company for similar accommodation. If, for instance, a £100 house and its appurtenances in Bow Road were transported bodily to Cromwell Road, it would be at once rated at £300 or £400; and simultaneously up would go the charge for water. As regarded their expenses, there was a decrease of £2700 in maintenance and repairs, which welcome diminution was fully anticipated after the heavy outlay recently incurred from revenue under this head in effecting the lowering of the mains, and in connecting them so as to avoid what were known as "dead-ends." Many hundreds of these "dead-ends," which caused inconvenience, and were liable to become frozen, owing to a certain extent of stagnation, had been done away with by this system of "coupling up;" so that they might safely say that they had minimized the effects of any future frost, however severe. It must not be supposed for a moment that the diminished outlay under maintenance and repairs prejudicially affected the up-keep of the works in the slightest degree. On the contrary, renewals, improvements, and safeguards were fully sanctioned under this head of revenue expenditure. The present decrease was merely owing to exceptionally large payments which were recently incurred once for all. As regarded the progress of works, the West Warwick reservoir—the last portion of the extensive scheme of additional storage sanctioned in 1894—was finished last September; thus completing all these new works well within the given time and within the sanctioned estimates, and bringing up their present storage to the 1200 million gallons which they had at this moment ready for use whenever required. To a certain extent there had been a lull in the large amount of contract work to which they had of late been so much accustomed. This was owing to the 1894 extensions being completed, and to those of 1897 being still in the initial stages of land purchasing and other necessary early steps. They had energetically pushed on their new well at East Ham. This was in an outlying portion, at the extreme south-east end of the district. They would have there a welcome supply from this source ready for distribution by the summer, as soon as it was required; and thus they were satisfactorily providing for this outlying, but rapidly increasing, quarter of their limits. He might say that there was an immense amount of building going on at East Ham, Ilford, and Canning Town. Houses were rising there in great numbers; and as soon as they were finished they seemed to be taken. Apparently a house was never vacant there, even for a short time. They received from the Government and the Companies' Analysts excellent reports as to the quality of the water sent into the district. In fact, as regarded the purity of their supply, they came next to the New River Company, which stood at the top of the class—thus surpassing the analytical results of the Companies drawing from the Thames. In the last report to the Local Government Board made by Sir W. Crookes and Professor Dewar, there was the following statement: "The two rivers supplying London with water are in remarkably good condition for the time of year. This is, no doubt, due to the abnormally low rainfall. The excellent condition of the filtering and storage works of the Companies is shown by the high quality of the water revealed by the enclosed analyses." In confirmation of this satisfactory conclusion, Dr. Frankland, the Government Analyst, stated that the East London water was, "after efficient filtration, delivered in excellent chemical and bacterial condition." The Registrar-General's returns showed that London still continued to maintain a good character for health when comparing its death-rate with that of most large towns; and that West Ham—a populous, low-lying district entirely supplied by the East London Company—came out in this respect much more favourably than London itself. In one week in the past half year the death-rate in the Borough of West Ham was only 9·3 per 1000, which he thought was about the lowest ever recorded there. They might have seen in the papers that a question was lately asked in the House of Commons as to an alleged

deficiency in the water supply of East London. The accusation was as vague as it was untrue. No localities and no names were mentioned, and perhaps he could not do better than read the letter which Mr. Crookenden wrote to the Secretary of the Local Government Board in answer to their requisition upon the subject. He (the Chairman) had rather been in hopes that the letter would have been read in the House; but it was not, and therefore he would read it to the meeting. It was dated March 23, and was as follows:—

Sir,—I have the honour to acknowledge the receipt of your telegram dated this morning, alluding to the question to be put to the President of the Local Government Board to-morrow by Mr. Harry Samuel, M.P., which appears in the "Votes" as follows: "To ask the President of the Local Government Board if he is aware that there has lately been a partial water famine in the East London district; and, if so, what steps Her Majesty's Government intend taking in the matter." In reply I am to state that the assumption of a 'partial water famine" contained in the question is absolutely without foundation. No complaints have been received by the Company; their storage reservoirs are all full; and the supply to the consumers has been continuous. Perhaps the hon. member will therefore say whence his information is derived, and to what particular locality as regards the alleged scarcity he refers.

It was all answered satisfactorily by Mr. Chaplin, and the matter dropped; but he (the Chairman) might say that they had had no complaints, no cessation of constant supply, and no want of pressure. Of course, they made inquiries directly this question was raised; but they failed to localize or identify the rumoured shortcomings, so that they could only characterize them as altogether baseless. They were to a certain extent attributable to the feeling that the London Water Supply had unfortunately been made a party hunting-ground. He believed this complaint was made just at the elections. [The Secretary: On the eve.] Their officers and the staff had rendered most willing and efficient service during the past half year. Indeed, this was fully borne out by the favourable condition of things he had just been able to announce. With regard to the Royal Commission which was presided over by Lord Llandaff, it began its sittings in November last; and its time had chiefly been taken up in hearing the evidence brought forward by the London County Council. All these investigations had occupied much of their time and attention; but it would be inopportune, and in fact it would be disrespectful on his part, to make any comments or remarks upon these subjects now, *pendente lite*, however interesting and important they might be to them. But he might say that they had furnished all the returns and information called for, and that they were ready to supply any further details that might be required by the Commissioners. In fact, they had nothing to keep back; and he should say that they rather courted than shrank from any inquiry. They had always done well before any capable and impartial tribunal; and he thought they might certainly say that the condition of their affairs had rather improved than been impaired in any way since those favourable verdicts were given. They might perhaps think that his remarks on this occasion had been brief and colourless; but they had had an uneventful and a prosperous half year. There was therefore really nothing for him to dwell upon, or to explain away; and he could only hope that, should it be his lot to meet them again as Chairman next October, he might be able to put before them the same short, satisfactory statement of their affairs as he had done on the present occasion. He concluded by moving the adoption of the report and accounts, and the declaration of a dividend at the rate of 8 per cent. per annum, less income-tax, on the ordinary stock of the Company for the half year ended Christmas last, payable on the 14th inst.

Mr. Herbert Dalton seconded the motion, which was carried.

The retiring Directors and Auditor were afterwards re-elected; a resolution being also passed increasing the Auditors' fees to 40 guineas per annum each.

Mr. Rokeby-Price afterwards proposed a vote of thanks to the Chairman and Directors. The statement addressed to them by the Chairman was, he remarked, so clear, concise, and so much to the point that even their enemies would be unable to pick a hole in it.

Mr. J. B. Knight seconded the motion, which was carried.

The Chairman, in acknowledging the vote, repeated that they had had a prosperous half year, and he might mention the only little difficulty they had had. The proper and legitimate business of their undertaking in providing pure water for the needs of the population, and in doing their best to satisfy their consumers and shareholders, was a very interesting and congenial occupation; but of late years many disturbing elements had arisen. Various kinds of investigations and political attacks had come upon them with, he might say, relentless regularity, and had rendered the conduct of their affairs a matter of some considerable labour and anxiety. This had been more especially the case as regarded their Engineer and Secretary. They might consider that, in furnishing the numerous returns which had been required and in attending meetings and consultations, a fourth of the year was taken up by their chief officials.

On the motion of Mr. Cuff, seconded by Mr. Rokeby-Price, a cordial vote of thanks was passed to the Engineer, Secretary, and staff.

The vote was acknowledged by the Secretary and the Engineer (Mr. W. B. Bryan); and the proceedings then terminated.

Reduction in Price.—The Milton-next-Sittingbourne District Council have decided to reduce the price of gas 5d. per 1000 cubic feet to private consumers, and 4d. per 1000 cubic feet for the public lamps; making the charges 2s. 11d. and 3s. respectively.

A New Pumping-Engine at the Hemel Hempstead Water-Works.—In order to meet the increasing demand for water in the district of the Hemel Hempstead Water Company, and to afford a more adequate supply in the higher levels, a new horizontal triple-expansion pumping-engine, capable of raising 30,000 gallons per hour, has been supplied and erected by Messrs. Simpson and Co.; and it was formally started a short time since by the Chairman of the Company (Mr. Samuel Stallon). It is supplied with steam by a Galloway boiler. The whole of the work has been carried out in accordance with plans and specifications prepared by Mr. A. F. Phillips, M.Inst.C.E., the Company's Engineer. The engine has been named "Victoria."

THE BOARD OF TRADE REPORT ON THE GAS AND WATER BILLS AND ORDERS OF THE PRESENT SESSION.

The Board of Trade report on the applications for Gas, Electric Lighting, and Water Bills and Provisional Orders for the present session was issued last Wednesday. It shows that the number of Bills relating to the supply of gas is 34, of which 29 are for England and Wales, 3 for Scotland, and 2 for Ireland. Three of the Bills contain provisions in regard to the supply of water. The capital proposed to be raised is £4,732,342—£1,951,117 by shares, and £2,781,225 by loans. The capital required for England and Wales includes £80,000 of share and £175,000 of loan capital proposed to be authorized for gas expenditure by Bills which, for the purposes of the report, have been included with the Water Bills. There are 47 Bills relating to the supply of water; four being for Scotland, and the rest for England and Wales. The total capital asked for is £5,246,083—£1,845,000 by shares, and £3,401,083 by loans. Of the amount required for England and Wales (£4,986,083), £18,000 of share capital is included in a Gas Bill, and £7500 of loan capital in two Bills grouped with the Gas and Tramways Bills. Provisional Orders to the number of 18 have been applied for in respect of gas and water supply; and 84 in regard to electric lighting schemes. The capital proposed to be raised under these Orders is: Gas, £254,250; water, £122,187; electric lighting, £2,148,670. Compared with last year, the number of Gas Bills is increased by 12; that of Water Bills is two less. The capital required for gas purposes is £3,606,534 more, and that for water purposes £788,563 more than last year. For Gas and Water Orders, the capital proposed is £126,021 less, and for Electric Lighting Orders £1,306,353 more than in 1897. The applications for the last-named Orders show an increase of 29, as compared with an increase of 17 last year. In addition to the Electric Lighting Orders, there are four Bills relating to England and Wales; but in only one case (that of the General Power Distributing Company) is the proposed capital stated—£1,000,000.

THE STOCKPORT CORPORATION AND THE WATER-GAS INQUIRY.

One of the circular-letters sent out by the Home Office, requesting information on the subject of carburetted water-gas, in view of the inquiry by the Departmental Committee to which reference has been made in the "Journal," was addressed to the Stockport Corporation, and came before the Gas and Electric Lighting Committee, who instructed the Town Clerk (Mr. Walter Hyde) to reply thereto as follows: "(1) That this Corporation has been manufacturing and distributing carburetted water gas, mixed with coal gas, in varying proportions up to 25 per cent. of the total throughout the town and district of Stockport, since Feb. 14, 1897. (2) That though Stockport, from its manufactures, is a town where a great amount of gas is used for industrial purposes—in most cases such as that of heating irons used in hat making, gassing yarns, &c.—in a manner to bring the workmen in direct contact with the fumes, yet no complaint has been made, or illness occurred which could be traced to the action of such gas or mixture. (3) The manufacture of this gas has enabled the Corporation to materially improve the illumination quality of the mixture sent out, without any increase in price; thus affording the consumers an actual benefit, the absence of which, through occasional stoppages of plant, they have been quick to note and to complain about; (4) The many advantages of this gas, together with the practical absence of further danger than that already existing with coal gas, make it highly desirable, in the opinion of the Gas Committee, that the action of gas departments or companies should not be restricted in any way." Mr. Hyde added that any further information the Committee might require the Gas Engineer (Mr. S. Meunier) has instructions to afford, either in writing or by appearing before the Committee, and he was also instructed to give special attention to any particular points required for the purposes of the inquiry, which might be suggested. The Committee's action received the approval of the Council at their last monthly meeting.

HALIFAX CORPORATION GAS AND ELECTRICITY WORKS.

Interesting Facts and Figures.

A few days since the members of the Halifax Corporation profitably spent a few hours in a tour of inspection of the gas and electricity works. They were invited to do so by the Chairman (Alderman Woodhead) and the Gas Committee, who afterwards entertained their visitors to dinner. The toast of the occasion was "The Corporation Gas and Electricity Committee," which was responded to by Alderman Woodhead, who was able to give a good account of both undertakings. He said that probably few members of the Council were aware that the electricity and the gas works covered a little over 10 acres of ground. Not only, however, was this area of ground covered; but it was nearly all in efficient and ample working order. Regarding the electricity works, notwithstanding that they appeared to have an adverse balance against them, he still regarded it as a flourishing institution. They began to prepare for an output far in excess of what they required either for their then or present needs. This, in the case of a private Company, might have been done a little differently. As a Corporation, however, notwithstanding that they had had a slight loss, he claimed that they had started on proper lines. More than ever was he convinced about this when he found what was transpiring in other large towns. He wanted the Council to take into consideration that the limit for borrowing money for the Electricity Department was a comparatively short one. They could only borrow it for thirty years; and their sinking fund for the past year amounted to rather more than £1300, while their loss was only £800. Practically, therefore, they had made by the undertaking during last year something above £500, not reckoning the sinking fund. If they maintained the building, plant, and everything in good repair, as they were doing, and kept up the sinking fund, it would follow, as a natural consequence, that in thirty years' time the undertaking would be their

own, and everything paid off. He thought that, in the light of these facts, he had good grounds for claiming that the electrical undertaking was fairly paying its way. They started by taking over the customers of the old Company, who had not more than 700 lights of 16-candle power. With private consumers, motors, and a limited amount of street lighting, they had now, they estimated, a custom equal to nearly 10,000 16-candle power lights. A year ago the total was 7000 lights; so that the rate of progress had been very marked indeed. He wanted the Council to bear in mind that the nearer they arrived at the maximum output, the nearer they would be towards making the electrical concern a paying one. When he reminded them, further, that they could increase the maximum output three times with little expenditure, they would easily see that, in the near future, the electrical works would be a good concern, and contribute towards the relief of the rates. Coming to the gas-works, the new offices, he thought, would satisfy even the most critical among them. The buildings were erected for very little in excess of the original estimate, and cost roughly about £10,000. To this another £3000 had to be added for machinery, fittings, and other plant. He had been assured during the last two or three days on good authority that, if they had to be erected to-day, they would cost at least £2000 more. With regard to the new coke-conveyor, the whole scheme was expected to cost £4000. They would save by this at least £375 a year. This would be effected after they had paid off 5 per cent. for maintenance, 3 per cent. for interest, and 3 per cent. for sinking fund. Even this, however, was not an end of what it would do, for it would enable them to place the men in the coke-house under better conditions of employment. With regard to the old end of the gas-works, they were losing by the method of carbonizing coal there no less than 3s. 6d. per ton, amounting to £4375. This would be altered as soon as the new works in course of erection were in working order. The new works, of course, could not be obtained without some additional expenditure; and this was estimated at £60,000. This would mean a great addition to their capital. If, however, for every £5000 expended, they had an adequate return, and this return not only mitigated the conditions of working, but gave the ratepayers of Halifax an additional profit, they ought not to hesitate in carrying out the work. The capital of the undertaking was certainly now a very large one. If they took the gross value at £450,000, they had paid off the sinking fund more than £100,000, and so had left a net capital account of £350,000. He could give them some idea how this capital had been used. In 1870, the cost per million cubic feet of gas produced was £999; in 1882, it was £724; and in 1897, £467, which was the lowest in the history of the undertaking. It was possible that these figures might advance a little when they had the extensions. It would simply be, however, because they would be prepared for a larger output. They would rest, as soon as these works were finished, and do comparatively little for a few years. Then, from that time, even the figure which they had now reached would be considerably reduced. A question which was agitating the minds of a great number of people was: "Will this increased consumption of gas continue?" They could only be guided by what had been done in the past; and in Halifax, notwithstanding the electric light, there had been a steady increase in the output of gas. During the past winter, they were somewhat on the wrong side. This, however, was also the experience of other towns; and it was accounted for by the mild weather, the absence of fogs, and the engineers' strike. Now that the strike was ended, they had begun again to turn out an increased quantity; and the output for last month was considerably in excess of the corresponding month of last year. In 1882, the net capital of the undertaking was £231,672, and the sinking fund £2598, which was equal to one in ninety. Last year the capital was £329,000, and the sinking fund £7670, which equalled one in forty-two. The sinking fund was considerably above £8000 a year; so that they were paying off their obligations at a somewhat rapid rate. The total increased output of gas for the last 14¼ years had been 114 per cent. The more he knew about the gas-works, the more convinced he was, not only that they were worth the capital cost, but a great deal more. There was no doubt whatever that, if the undertaking was offered to the public, they could easily get a million of money for it from a private syndicate; and he had no doubt that the private syndicate would show the public that it was worth two millions. Alderman Brook, in also replying, stated that the works had made greater progress during Mr. Holgate's management than during any previous period.

SUPPLY OF WATER GAS AND COAL GAS IN BOSTON (MASS.).

Asphyxiation by Illuminating Gas.

In our editorial columns on the 29th ult., it was stated that the Board of Gas and Electric Light Commissioners had made a special report to the State Legislature, on their order, relative to certain deaths from asphyxiation by illuminating gas which occurred in Boston in January last year. The House wished to have such recommendations for legislation as might seem expedient to the Board; and these formed the concluding portion of the report. After describing the cases in detail, the Commissioners say:—

As to what legislation may be expedient, several propositions have been suggested to, and considered by, the Board. First, to require the use in the sleeping-rooms of hotels and lodging-houses of some kind of burner from which the gas cannot escape except when lighted; secondly, to prohibit the use of gas in sleeping-rooms which contain less than a definite number of cubic feet; thirdly, to provide for the systematic inspection of gas fixtures and piping by some duly authorized public officer; and, fourthly, to define by statute the amount of carbonic oxide or other ingredient which may exist in the gas, and to prohibit the distribution of gas containing an excess of such ingredients.

We have endeavoured to examine these suggestions with the aid of all the data in our possession bearing upon the subject. The attention of the Board has from time to time been called to certain types of burner which automatically stop the flow of gas if blown out or otherwise accidentally extinguished; but, through lack of confidence in their durability and certainty of operation, the Board has not seen its way clear to recommend legislation which would require their adoption. The unreliability of the burners heretofore considered has already been proven; and though other types are now proposed for use, and have been examined by the Board, none of these seem to promise that degree of efficiency and durability which ought to be combined in any mechanical contrivance whose use for this purpose is to be made compulsory by statute. To require by law the use of an inefficient article might, by inviting confidence in its reliability, increase rather than diminish the number of accidents. If it be within the range of mechanical possibility to make a device that will fulfil the requirements of safety, simplicity, and effectiveness at a reasonable cost, it may be found expedient to make some special provision for examining and testing such appliances, and for stimulating their invention.

The second suggestion probably arises from the fact, generally well understood, that fatal accidents from escaping gas occur most frequently in sleeping-rooms of very small size and without ventilation, such as the side rooms in houses in a city block; but these accidents are by no means confined to such rooms. They have, in fact, occurred in rooms so large that to reach all cases it would be necessary to prohibit the use of such appliances in all sleeping-rooms of whatever size or location. When we consider the large number of such rooms in which gas is used without any harm whatever, and the great convenience which it brings, it will be seen that such prohibition would be, upon the whole, inadvisable.

Out of the total of 357 casualties reported to the Board during the seven years ending with the 31st day of December, 1896, 22 were perhaps in some degree attributable to imperfect fixtures—that is to say, imperfect fixtures were found, and may have combined with other causes to produce the accidents. Of these 13 were fatal. The particular imperfections found and the number of persons affected are as follows: Keys turning completely round without stopping, so that they might unwittingly be turned too far and the gas turned on again, 8; keys worn so loose as to turn too easily, so that they might unintentionally be re-opened after the gas was turned off, 2; fixtures for gas and electric light so constructed that the gas-key might be accidentally turned in the dark instead of the electric, 2; fixtures intended by the pulling of a chain to open a valve and let on the gas, and, at the same time, light it by an electric spark, 3; defective automatic regulator in basement, 2; two keys so near together that one might be mistaken for the other and turned unintentionally, 5. While it may be too much to expect that an inspection of pipes and fixtures would greatly reduce the number of casualties, it might eliminate some of them; and, as poor piping and fixtures rather than poor gas are not infrequently the cause of poor light, some advantage in this respect might also be obtained through a strict supervision of such appliances. As to the probable efficiency of such supervision and the amount of work which would be imposed upon the department or officer charged with this duty, it is to be noted that within the municipal limits of the city of Boston, there were in actual use, on the 30th day of June last, 81,521 meters, about 50,000 gas-stoves, and, as nearly as can be estimated, 1,200,000 burners. Only part of the latter are in use in private apartments, hotels, and lodging-houses; many, of course, being employed in stores, shops, and offices. From 600,000 to 700,000 may be a fair estimate of the number in the first three classes. Should such inspection be thought by the Legislature to be wise, the Board would respectfully suggest that it might, at the option of each city, be assigned to a municipal department vested with ample powers, similar to those now exercised by other sanitary officers, so that the elimination of imperfect or improper appliances might be assured.

The gas in general use in 25 of the larger cities and towns in the State is what is commonly known as water gas, or a mixture of coal gas and water gas in varying proportions. It is essentially of the same composition as that used in nearly every city in the country of any considerable size, wherever a high candle power of gas is demanded at a low price. Its distribution was formerly prohibited in this State, but was allowed by an Act of the Legislature in 1890, with little or no opposition, after the subject had been carefully and exhaustively considered at previous sessions and its advantages and disadvantages had been fully weighed, not only by Committees of the Legislature, but apparently by the Press and the public. No legislation of which we have any knowledge has elsewhere been adopted on account of accidents arising from its use.

There is a consensus of scientific opinion that the most dangerous element in illuminating gas is carbonic oxide, and that, while other elements may produce asphyxiation, this induces a poison through changing the character of the blood. All illuminating gas contains some carbonic oxide, and any kind is therefore dangerous to life if it is not burned but breathed; so also gas which is entirely harmless in the hands of those who exercise reasonable care may, with all other conditions alike, be very dangerous in the hands of the very careless or ignorant. The percentage of carbonic oxide in the gas in this State varies from about 6 to 25, according to the method of its manufacture and the amount of so-called water gas which it contains. It has been satisfactorily shown in laboratory experiments that a very small percentage of this gas in a tightly-closed apartment will speedily and invariably cause death; and if the same conditions were met in actual experience, the same results would probably follow. The question of what percentage of this gas may advisedly be allowed in illuminating gas is a very perplexing and difficult one to solve satisfactorily, particularly because, in the investigation of specific cases, great difficulty is experienced in securing adequate and reliable information. It is frequently impossible to ascertain the length of time that the gas has been flowing into the room and the amount per hour which passed through the burner. The excitement usual at the moment of the discovery of the person injured greatly affects the reliability of any testimony as to whether the stopcock was fully or partly open. In some instances it is apparent that the inhaling of gas alone would not have produced death but for its combination with diseases existing at the time. In some of the cities supplying this kind of gas, no fatal instances have ever occurred from its use. Numerous cases exist where two persons are subjected to the same gas in the same room, under apparently the same conditions, where one dies and the other recovers.

Of 179 persons mentioned in the cases reported, who recovered after becoming unconscious, 10 had inhaled coal gas, and 169 water gas. Of 176 fatal cases occurring within the same period, 55 were clearly suicidal, with some evidence of a similar intent in certain others. The fatal cases occurred as follows: In 1889, 2; in 1890, 10; in 1891, 12; in 1892, 18; in 1893, 25; in 1894, 33; in 1895, 26; and in 1896, 50. Those classed as

the suicidal occurred as follows: In 1889, 0; in 1890, 3; in 1891, 3; in 1892, 9; in 1893, 4; in 1894, 10; in 1895, 11; and in 1896, 15.

The cases which occur from the breaking of mains in the streets may be considered as constituting a distinct class. During the period named, there have been 13 instances in which 75 people have been rendered unconscious, of whom 63 recovered. If we were to classify all the cases in another way, we should find that in the seven years during which water gas has been in use, with the exception of those due to broken mains and imperfect fixtures, all the instances reported to the Board have occurred through what appears to have been a lack of reasonable and ordinary care on the part of the victims. All these cases it would seem might have been prevented by the exercise of less care than is probably necessary to avoid an electric car in a crowded street. How to provide by legislation against instances which are due to such a cause is a subject of extreme difficulty. That illuminating gas is highly dangerous when used for any other purpose than to be burned, and that due care in respect to it is necessary if it is to be used with safety, is well known.

The proprietors of hotels of the cheaper class have in many cases taken extraordinary precautions to prevent these accidents in their houses. Openings have been made in the upper portion of the doors to the rooms, so that the watchman might more readily detect escaping gas. Warning notices have been fastened upon or near the gas-fixtures, and, very often, when the lodger was of the class to invite such precaution, special efforts have been made to instruct him in respect to the use of the gas. Even these precautions have not entirely prevented accidents.

There exists in the minds of some the very erroneous idea that the water gas in common use is odourless. What is known as strictly pure water gas is odourless; but such gas is not practicable for illuminating purposes, and its distribution might well be prohibited by law. As the term is usually understood, water gas used for illuminating purposes in this State contains a large percentage of gas made from oil, which gives to the entire body a pungent odour, so that it is estimated that if 1-1000th part of the atmosphere in any apartment be composed of it, it can be readily detected. When such odour is noticed in the interior of buildings from any cause, notice should at once be given to the company, who should respond to such call as promptly as possible. Police patrolmen should be required to report immediately when the odour of escaping gas is noticed in the street, however slight it may seem to be; and notice should be sent with equal promptness to the company, which knows how to deal with it, and whose duty it is to stop it.

The statements and suggestions herein contained are submitted in response to the order of the House in the hope that they may be of some service in solving a most difficult problem, but with full recognition of the fact that they give but limited promise of preventing the recurrence of these fatalities.

How to satisfy the demand for a gas which shall give the best light at the lowest cost, and how at the same time to devise such legislation as shall be adequate to prevent accidents arising from its careless use is a problem of which the importance has been constantly impressed upon the Board, and to which it has given much study, but is one which it must reluctantly confess it has not yet been able to satisfactorily solve.

THE ELECTRICITY SUPPLY OF LONDON.

At the Meeting of the Institution of Civil Engineers last Tuesday, a paper on this subject was read by Mr. A. H. Preece, Assoc.M.Inst.C.E.

The author commenced by saying that the supply of electricity on a commercial scale was started in London after the passing in 1888 of the Act of Parliament which amended the Act of 1882, principally by extending the date for compulsory sale to a local authority from 21 to 42 years. In 1888 many companies applied for Provisional Orders; and, in determining which were to be granted powers, and the districts over which they were to extend, the Board of Trade decided that competition would be advantageous to the public, and that it was advisable to allow one direct-current system to compete with one alternating-current system. There are now in London eleven important Companies and five Vestries supplying electricity; and three other Companies and three Vestries are taking steps to start works. The capital invested in the industry amounts to £6,000,000; and plant has been installed to the extent of 80,000-horse, power, the equivalent of 2 million 8-candle lamps being connected to the mains. The total annual revenue is £800,000; and the total annual expenditure, £450,000.

Of the systems for supplying electricity in London, the alternating current is applicable to large areas where consumers are scattered; and it enables the generating works to be established by the riverside, or where land is cheap and coal easily unloaded. The undertakings using this system are the City of London Company, the Metropolitan Company, the London Electric Corporation, the County of London Company, the House-to-House Company, the Hampstead Vestry, the Islington Vestry, and the Hammersmith Vestry. The direct-current systems are divisible into two classes—the high pressure and the low pressure. In the former, rotary transformers are used to reduce the high pressure to a low one; while the latter produces and distributes electricity at the same pressure at which it is supplied to consumers. The direct-current systems are applicable to compact areas, and, with the use of high pressure, to scattered or isolated compact areas. The chief advantages of the direct-current system are the possibility of using storage batteries, which cannot be employed with the alternating-current systems, greater efficiency in distribution, and greater adaptability to motive power. The undertakings using the system are the Chelsea Company (high pressure), the Charing Cross and Strand Corporation (high pressure) the Westminster Corporation, the St. James's and Pall Mall Company, the Kensington and Knightsbridge Company, the Notting Hill Company, the St. Pancras Vestry, and the Metropolitan Company (at one works).

The generating works of the several undertakings in London contain many interesting features. No less than twenty different works have been erected. The boilers used comprise the water-tube, marine, Lancashire, and miscellaneous types; but the preference for the water-tube boiler is very marked. The works are liable to sudden demands through fogs, and the quick-steaming properties of this type of boiler are of great advantage. The boilers are fired chiefly by hand with Welsh coal; but in the works of the City of London Company and the County of London Company mechanical stokers and cheaper coal are used. The use of extensive

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 821.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 14	10½	Alliance & Dublin 10 p. c.	24—25	..	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	16½—17½	..	4 5 8
300,000	100	Jan. 3	5	Australian 5 p. c. Db.	105—107	..	4 13 6
200,000	5	Nov. 11	6½	Bombay, Ltd.	5¾—6¼	..	5 4 0
40,000	5	,,	6½	Do. New, £4 paid	4¾—5¼	..	4 19 1
380,000	Stk.	Feb. 24	12	Brentford Consolidated	293—298	..	4 0 6
240,000	,,	,,	9	Do. New	223—228	..	3 18 11
50,000	,,	,,	5	Do. 5 p. c. Prf.	140—145	..	3 9 0
159,375	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	134—138	..	2 18 0
220,000	Stk.	Mar. 30	11½	Brighton & Hove Orig.	270—275*	..	4 3 8
218,820	,,	,,	8½	Do. A. Ord. Stk.	195—200*	..	4 5 0
933,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	127—132	..	3 15 9
420,000	20	Ma . 30	11½	British	55—56*	..	4 0 4
50,000	10	Mar. 11	11½	Bromley, Ord. 10 p. c.	25—27	..	4 5 2
75,000	10	,,	8½	Do. 7 p. c.	20—22	..	3 17 3
500,000	10	Oct. 14	6	Buenos Ayres (New) Ltd	9¼—9¾	−¼	6 3 1
98,122	Stk.	Dec. 30	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	Mar. 11	8½	Cagliari, Ltd.	30½—31½	+½	5 4 9
100,000	10	Sep. 30	8	Cape Town & Dis., Ltd.	16—17	−1	4 14 2
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	59—61	..	4 18 5
550,000	Stk.	Oct 14	13½	Commercial Old Stock.	340—345	..	3 18 3
200,750	,,	,,	10½	Do. New do.	255—260	..	4 0 9
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Db. do.	154—157	..	2 17 4
800,000	Stk.	Dec. 15	12	Continental Union, Ltd.	225—235	..	5 2 2
200,000	,,	,,	9	Do. 7 p. c. Prf.	207—212	..	4 4 11
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	310—315	..	4 8 11
168,400	,,	,,	11	Do. B 7 p. c.	255—265	..	4 3 0
535,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	128—133	..	3 18 11
60,000	,,	,,	5	Do. 5 p. c. Prf.	140—143	..	3 9 11
486,090	10	Jan. 27	11	European, Ltd.	24—25	..	4 8 0
354,060	10	,,	11	Do. £7 10s. paid	17—18	..	4 11 9
5,922,110	Stk.	Feb. 10	12½	Gaslight & Coke, A, Ord.	280—285	..	4 9 6
100,000	,,	,,	4	Do. B, 4 p. c max.	118—123	..	3 5 1
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	305—315	..	3 3 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	150—155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	220—225	..	3 6 8
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	195—200	..	3 10 0
468,000	,,	,,	10	Do. J, 10 p. c. Prf.	305—315	..	3 3 6
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	184—189	..	3 3 6
1,061,150	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	133—136	..	2 18 10
294,850	,,	,,	4½	Do. 4½ p. c. do.	150—155	..	2 18 1
988,000	,,	,,	6	Do. 6 p. c. do.	202—207	..	2 18 0
70,000	10	Oct. 28	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	Nov. 11	10	Imperial Continental	213—218	..	4 11 9
376,400	100	Feb. 1	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Db. Stk.	103—106	..	3 6 0
560,000	100	Apl. 1	5	Met. of Melbourne 5 p. c. Db.	110—112*	..	4 9 3
250,000	100	,,	4½	Do. 4½ p. c. Db.	107—109*	..	4 2 7
				* Ex div.			

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	Dec. 15	6	Malta & Medn., Ltd.	5½—6	..	5 0 0
541,920	20	Nov. 11	5	Monte Video, Ltd.	15—16	..	6 5 0
617,946	Stk.	Feb. 24	9¾	Newc'tle & Gatesh'd Con.	235—240	..	4 1 3
252,355	Stk.	Jan. 3	3½	Do. 3½ p. c. Db. Stk.	115—120	..	2 18 4
150,000	5	Nov. 26	8	Oriental, Ltd.	8—8¼	..	4 14 2
135,000	5	,,	8	Do. New, £4 10s. pd.	7—7½	..	4 16 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—2	..	4 0 0
60,000	5	Mar. 11	7	Ottoman, Ltd.	4½—5	..	7 0 0
420,000	100	Nov. 2	6	People's Gas } 1st M. Bd.	104—109	..	5 10 1
500,000	100	Dec. 1	6	of Chicago } 2nd do.	103—108	..	5 11 1
848,070	10	—	—	River Plate Ord.	9¼—9¾	..	—
250,000	Stk.	Jan. 27	4	Do. 4 p. c. Db. Stk.	99—101	..	3 19 3
250,000	10	Sep. 30	10	San Paulo, Ltd.	16—17	..	5 17 3
135,000	Stk.	Mar. 30	10	Sheffield A.	242—248*	..	4 0 8
209,053	,,	,,	10	Do. B.	245—248*	..	4 0 8
447,487	,,	,,	10	Do. C.	245—248*	..	4 0 8
5,531,250	Stk.	Feb. 24	5½	South Metrop., 4 p.c Ord	136—139	..	3 15 6
1,460,000	,,	Jan. 13	3	Do. 3 p. c. Db. Stk.	103—106	−1	2 16 7
60,000	Stk.	Mar. 11	12	Tottenham and } A.	285—295	..	4 1 4
60,000	,,	,,	9	Edmonton } B.	205—215	..	4 3 9
182,880	10	Dec. 20	7	Tusean, Ltd.	13¾—14½	..	4 16 7
149,900	10	Jan. 3	5	Do. 5 p. c. Dbs. Red.	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	Dec. 30	10½	Chelsea, Ord.	330—330	..	3 3 8
150,000	,,	,,	5	Do. 5 p. c. Prf.	177—180	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p.c. Pf. Stk., 1875	157—160	..	2 16 3
175,785	,,	Mar. 30	4½	Do. 4½ p. c. 1 b. Stk.	158—163*	..	2 15 3
1,720,560	Stk.	Oct. 14	8†	East London, Ord.	227—232	..	3 9 0
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Db. Stk.	158—166	..	2 14 3
390,000	,,	,,	3	Do. 3 p. c. Db. Stk.	105—107	..	2 16 1
700,000	50	Dec. 15	7½	G'd Junct'n, 10 p. c. max.	119—123	−1½	3 1 0
310,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	143—148*	..	2 14 1
708,000	Stk.	Feb. 10	13	Kent	358—363	..	3 11 8
160,000	,,	,,	7	Do. New, 7 p. c. max.	218—218	..	3 4 3
1,043,800	100	Dec. 30	10	Lambeth, 10 p. c. max.	298—303	..	3 6 0
406,200	100	,,	7½	Do. 7½ p. c. max.	228—233	..	3 4 4
350,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140—145*	..	2 15 2
500,000	100	Feb. 10	13	New River, New Shares	443—448	..	2 18 1
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Db. Stk.	142—147	..	2 14 5
902,300	Stk.	Dec. 15	6	Southw'k & V'xhall, Ord.	155—160	..	3 15 0
126,500	100	,,	6	Do. do. 7½ p. c. max.	152—157	..	3 16 5
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf.	174—179	..	2 15 10
1,019,585	,,	Oct. 14	4	Do. 4 p. c. A Db. Stk.	146—149	..	2 13 8
1,155,066	Stk.	Dec. 15	10	West Middlesex	303—308	−2	3 4 11
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	160—165	..	2 14 7
200,000	,,	Mar. 11	3	Do. 3 p. c. Db. Stk.	105—107	..	2 16 1
				* Ex div.			

† Next dividend will be at this rate.

systems of steam-pipes is now being dispensed with. The multiplicity of valves is unnecessary; and the number of valves is being reduced, and arrangements are made as simple and with as few joints as possible. The tendency is towards engines of the marine type for large outputs. The high-speed engine is not used for more than 750-horse power. Some engineers, however, find engines of 350-horse power sufficiently large, and the most convenient unit to adopt. The dynamos are similar in most works, and are always connected direct to the engines. Storage by secondary batteries is not extensively employed, as their maintenance has proved expensive. But a few works use them entirely for maintaining the supply after midnight, and in the daytime in summer. The author gave the results of a test of a small marine engine and alternator, showing the combined efficiency to be 85·5 per cent. He said the question of vibration had been of great importance in many works; but no cure had been found effective when once vibrations were set up. High-speed engines must have three cranks to be free from appreciable vibration.

The favourite methods of distributing electricity are to transmit current at a high pressure in heavily-insulated cables in iron pipes, and current at a low pressure in insulated cable in stoneware conduits or in cables heavily armoured and laid direct in the ground. Rubber is now little used, paper and jute, impregnated with insulating compounds, having been extensively adopted.

The usual system of measurement of the electricity supplied is by meter, and the average charge is 5½d. per unit. The average charge in 1890 was 7½d.; so that the price has been reduced in eight years no less than 25 per cent., or equivalent to a reduction in the price of gas from 4s. to 3s. A curve was given to show the variations in the price of gas since 1870. The average price has varied between 4s. and 2s.; it is now 2s. 7d. The author pointed out that the cost of generating and distributing electricity had been greatly reduced in the last few years. In 1892 it was seldom supplied for less than 4½d. per unit. The usual cost is now 2½d. to 3d. The actual cost of generating is about 1½d. per unit; and the cost of management, &c., about 1d. The direct current is everywhere produced at a cheaper rate than the alternating current. The difference is between ½d. and 1d. per unit, or 20 per cent. cheaper. Since 1888 an important inquiry had been held by the Board of Trade regarding the maximum pressure permissible in consumers' premises. The result of this inquiry, in 1896, was to increase the pressure from 150 to 250 volts.

A comparison was made between the two largest Companies in London —viz., the City of London Company, who supply alternating current, and the Westminster Corporation, who supply direct current. Both Companies have nearly the same number of lamps connected to their systems; the number of 8-candle lamps being 270,898 and 269,939 respectively. The capital expended is £945,829 and £546,434; the annual income per 8-candle lamp, 11s. 9d. and 7s. 9d.; the annual expenditure, 4s. and 3s.; and the cost per unit, 7·6d. and 5·8d.

The author concluded by saying that the industry is growing so rapidly that most undertakings have to seek new sites for generating stations, and the tendency is to erect large works on the outskirts of London, where coal can be conveniently brought to the site, and water obtained for condensing. The powers granted under Provisional Orders are limited as regards the compulsory purchase of land; and further powers are being sought by some companies from Parliament, so that they may be placed on the same footing as railway companies. No less than 40,000-horse power is now being installed in London in order to meet the demand for electricity in the immediate future.

ELECTRIC LIGHTING NOTES.

The accounts of the Electricity Department of the Bristol Corporation for the year ending March 25 show a substantial advance upon the working of former years. A year ago there were 614 customers, with 38,302 lamps; while at the present time there are 814 customers, with 49,917 lamps. The trading profit for the year was £11,307, and the net profit £3290. The trading profit exceeded 8 per cent. of the capital expended, although a considerable amount of it has been spent on buildings and plant which have not yet come into operation, and have thus not tended to produce revenue. Additions are being made to the plant, and extensions of the public lighting are in progress. Before the summer is ended, it is expected the arc lamps will be increased threefold.

The Peterborough Town Council have had another rebuff from the Local Government Board respecting their application for sanction to a loan for an electric lighting scheme. They asked for permission to borrow £15,000; but the Board, having considered the report of their Inspector (Mr. Meade King), have intimated that they are unable to comply with the request. The ground on which the Board base their refusal is the narrowness of the margin of the borrowing power now remaining to the Council. The members of this body who are favourable to the scheme have shown remarkable persistency in the matter; and they have even gone the length of seeking and obtaining an interview with the President of the Local Government Board. This took place last week, with what result we are at present unable to say.

The Oldbury District Council, who are applying for an Electric Lighting Order, found themselves affected by the proposals of the Midland Electric Corporation for Power Distribution, Limited; and they accordingly decided to oppose the application. The parties have, however, come to an arrangement whereby both Orders will go forward. The Corporation are to be prohibited from supplying electricity within the District of the Council for public and private lighting purposes without their written consent, and on paying the expenses in connection with their Order and their opposition to the Midland Order. The intention of the Council is to maintain the control of the public lighting of the town, and make arrangements for the Midland Corporation to supply them in bulk at a reduced rate, but serve manufacturers on their own account.

The question of how best to utilize their Electric Lighting Provisional Order has long been debated by the Swansea Town Council; but up to the present without result. Now they are starting afresh; and Mr. E. Manville has reported on a modest scheme, which he estimates will cost £32,470. This is on the low-tension continuous current system; but he gives an estimate for another scheme on the high-tension alternating

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WINDSOR STREET WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
TORONTO (Second Contract; Remodelled)	2,000,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	1,500,000
WINNIPEG, MAN.	500,000

current system, amounting to something like £3500 more. He supposes that for private lighting the equivalent of 15,700 8-candle power lamps will be connected to the mains; and, assuming each used 15·1 Board of Trade units per annum at an average of 4½d. per unit, that they would yield £4444. Adding to this £733 for public lighting, the revenue would amount to £5177. The expenditure, including interest and sinking fund, he estimates at £4125; leaving therefore a balance of £1052, part of which would be required to pay interest and sinking fund on the cost of the site, and the remainder would be available for the reduction of the rates or otherwise. Mr. Manville also comments upon a report by the Borough Surveyor (Mr. G. Bell) on the question of combining a dust-destructor with the electric power installation. He agrees with Mr. Bell's figures for the capital cost of a destructor with the extra buildings required over those provided for electric lighting only, and including the extra cost of the boilers, &c., at £11,000, or with the addition of the site on which it would stand at £13,000. Mr. Bell estimates a saving of £632 per annum as the result of using the refuse as fuel; but Mr. Manville reduces it to £184. However, he agrees with the combination, which appears, "both on sanitary and economical considerations, to be desirable."

At the meeting of the Liverpool City Council last Wednesday, Mr. C. Petrie moved the approval of the Lighting Committee's recommendation, that as from April 1, 1898, the prices to be charged for the supply of electrical energy at a pressure of 230 volts be: For general lighting, 5d. per unit up to 1000 units per quarter, and 4d. per unit in excess of that quantity; for Corporation departments, 4d. per unit; for street lighting, 3d. per unit; for power purposes, 2d. per unit. Sir Thomas Hughes said it was all very well for the Committee to go on reducing prices in this way; but where did the general ratepayers come in? The electric lighting was, after all, a commercial concern, having the advantage, however, of borrowing unlimited capital on the credit of the ratepayers at a very low rate. Now that electricity was being supplied at a reasonable price, the ratepayers should have some recompense. The Lighting Committee by these reductions might easily do injustice to the general public, seeing that electric light never could be brought within the reach of the great majority of householders. Mr. J. Lister cordially agreed with Sir Thomas Hughes that the ratepayers as well as the consumers should have some benefit. Mr. Dart thought it inconceivable that Sir Thomas Hughes should have taken the line he had just adopted. He (Mr. Dart) believed it possible to bring electric light within the reach of the whole community. Next year the Committee hoped to reduce the price to 4d.; for at 6d. the cost was double the cost of gas. At 4d., electricity would be equivalent to gas at 4s. per 1000 cubic feet; but the consumer recouped himself in painting, paper, the preservation of his furniture, and better health. Mr. Rutherford asked why a higher price should be charged to small consumers. Could not the Committee put in electric wiring, as was done in other towns, free of charge, except as regarded a small rental to recoup the outlay? Mr. Petrie said the lower price was now charged for more than 1000 units a quarter, as compared with the former limit of 1000 units a month. The Committee already charged rental for wiring. The price of electricity in Liverpool was higher than in all the other large towns. He was convinced that a reduction to 4d. would result in an enormous increase in consumption. The recommendation was adopted.

The Mayor of Bradford (Mr. T. Speight) has presented to the Gas and Electricity Committee, of which he is Chairman, a report containing the result of the observations of a deputation who recently visited the Continent for the purpose of inquiring into the various systems of electric lighting and traction. The deputation consisted of the Mayor, Mr. W. C. Dixon, Mr. T. H. Shaw, and the City Electrical Engineer (Mr. A. H. Gibbings); and they visited Brussels, Hamburg, Berlin, Dresden, and Leipsic, the electric equipment of which towns was described at considerable length. It appeared that at Leipsic they inspected the works of Messrs. Körting and Mathieson, arc-lamp makers, where special inquiries were made with a view to improving the public lighting arrangements of Frizinghall and Heaton by means of small arc lamps instead of the present incandescent lamps. The drawback to the use of small arc lamps was found in the fact that they had to be re-carboned every eight or ten hours. It was stated that the deputation were satisfied that the arrangements which have already been made at the electricity works at Valley Road for running the Bolton Road and Great Horton tramways are as complete as anything which they have seen on the Continent. The generating stations, however, were very much larger and finer than anything to be seen in this country; and there could be no question but that, instead of making undue haste in the matter of electric traction and lighting, Bradford was in each of these instances considerably behind the development which had already taken place in each of the towns visited. It appeared to be the practice to utilize either the accumulator system or the conduit system for crossing the more important thoroughfares in the centre of the town with electric trams—thus doing away not only with the unsightliness, but possible danger of the overhead wires; and although the initial cost of the conduit system was considerably higher than the overhead, yet in such places as they had seen, each company was unanimous in saying that it was far preferable in the centre of the cities. The Committee have decided to recommend the Council to reduce the charge for lighting to 4½d. per unit, and to adopt a new scale for electricity used for motive power. This will provide that for a minimum of four hours' continuous use, with a consumption of 550 Board of Trade units, the charge shall be reduced to 2d. per unit, with intermediate reductions up to eight hours' continuous use and 1200 units consumption, at which the charge will be 1d. per unit.

Extensions at the Rotherham Gas-Works.—At the meeting of the Rotherham Town Council last Wednesday, it was agreed, on the recommendation of the Gas Committee, to spend £20,000 on the extension and general improvement of the gas manufacturing plant, so as to be equal to a production of 2 million cubic feet per day. The Chairman of the Committee (Mr. G. Gummer) explained that the works specified in a report received from their Consulting Engineer were necessary to keep pace with the large demand for gas. The Manager (Mr. F. A. Winstanley) has reported on the condition of the mains; and he is to submit an estimate of the cost of renewing those in the principal thoroughfares.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners held a special meeting last Thursday to fix the contracts for coal, lime, and other stores required in the forthcoming financial year. Bailie Kinloch Anderson, the Convener of the Works Committee, presided. He said they had been called together to receive a report from the Works Committee. Everyone who was present there was present at the meeting where they adopted the report of a Sub-Committee on the Stores. He did not know that they would want to hear the recommendations read again in detail. Did they accept the recommendations of the Committee? The Commissioners shouted "Agreed;" and the Chairman, one minute after the meeting had been declared open, intimated that that was all the public business. The quantity of coal contracted for was 145,500 tons. This is a somewhat less quantity than was arranged for a year ago, which is explained by the use of the new carburetted water-gas plant. The price is on an average 3d. per ton less than the average price which is being paid under the current contracts. This, again, is to be accounted for by the fact of the use of carburetted water gas; it being possible to dispense with some of the high-priced cannels. On the coal contract alone there will thus be a saving to the Commissioners, next year, of nearly £2000.

In connection with this fixing of the Edinburgh contract, it comes as rather a startling announcement that on the previous day (Wednesday), at a meeting of coalmasters in Glasgow, it was resolved to withdraw all tenders for coal which had been sent in—not to Edinburgh alone, but everywhere, unless at an advance of 2s. per ton. This was on account of the trouble with the miners in Wales. I may say that the meeting of the Edinburgh Commissioners was not held on account of this resolution, because the notices calling the meeting were issued on Tuesday. Still, the consequences might have been awkward for the Commissioners, at least to the extent that they would not have been able, in the meantime, to accept any of the offers, and would have had to take their risk of prices being permanently raised by the Welsh incident. They have, fortunately, escaped this, but only, it may be said, by "the skin of their teeth." This view is not affected by the fact that only one of the tenderers did actually withdraw the offer sent in. It might have been that they had all done the same; and then the Commissioners would certainly have been in a fix. That only one withdrawal was intimated gives rise to more than one reflection. The first is as to the loyalty of members of a combination to each other. It is apparent that a restrictive resolution need not be expected to be carried into execution. There are always some—in this instance the vast bulk—who will disregard it. That it was the vast bulk who broke through the resolution seems to point to the decision not having been arrived at so much out of the necessities of the situation as for some other purpose. It may, for instance, have been intended to get certain competitors to withdraw, in order that the others should obtain the orders. If this were so, the fact that, so far as Edinburgh is concerned, only one did act on the resolution should show those who were responsible for the taking of the step that everyone on the Glasgow Coal Exchange is not green to his business, but that they can nearly all think for themselves. There is another incident connected with this Edinburgh business, which is that the offerer who withdrew was not in the list of those whose offers were recommended by the Committee for acceptance; so that this offerer might, if he had known it, have saved himself the trouble of withdrawing. It remains that, although there was only one withdrawal in Edinburgh, there may be more in connection with tenders to other towns; and thus, while, in Edinburgh, they have escaped from the effects of the resolution of the coalmasters, other places may be hit. It is this which makes the situation one of interest to gas managers who may be at present asking tenders for coal supplies. The whole affair may be merely a rig of the market; and if so, it has, thus far, proved abortive. It may, on the other hand, be a serious move. Gas managers should take counsel together on the subject. Individual opinion might be erroneous; but consultation might lead to the acquisition of information which would guide managers as to the proper course for them to take.

The Edinburgh and Leith Gas Commissioners held their annual dinner last night. I was not present; but I understood that Bailie Kinloch Anderson was to dwell upon some features of the coal contract question. The report of the meeting which I have seen, however, contains no additional information to that given at the meeting of the Commissioners in the afternoon, except the welcome intelligence that there is no immediate prospect of an increase in the price of gas. Either he must have changed his mind, or the subject was too technical for the reporter to notice in his account of the proceedings.

At a meeting of the Inverness Town Council on Monday a letter was read from a local firm of Solicitors, intimating that they were about to form a Company for the introduction of electric light into the town. A Glasgow gentleman also wrote offering his services as Consulting Electrical Engineer. Provost MacBean moved that, looking to the amount invested by the Corporation in acquiring the undertaking of the Inverness Gas Company, and extending and improving the lighting of Inverness by gas, it was proper that any scheme for introducing electric light should be promoted by the Town Council, and that a Committee should be appointed to ascertain whether there was such a demand for the light as to justify the Council in taking steps to introduce it. Mr. William Mackay moved an amendment in favour of the new Company, with a reservation of the option to acquire the Company's undertaking. By the casting vote of Provost MacBean, his motion was carried.

The Airdrie and Coatbridge Water Company, whose new water-works in connection with the water supply from Cowgill, near Biggar, are now nearing completion, are intimating to consumers that they are to raise the rates of assessment and other charges by 33⅓ per cent., or one-third more than they are at present. The domestic rate will therefore be raised from 1s. per rental of £9 and upwards at which it has been all along, to 1s. 4d., and the rates and charges for other supplies are to be increased correspondingly.

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 7.

Sulphate of Ammonia.—Throughout the week the market has been fairly steady; the closing prices being £8 15s. to £8 17s. 6d. per ton delivered f.o.b. at the ports. There has been a fair export demand for immediate delivery; but supplies have been sufficient at all points. Makers continue to market their production as it becomes available. The home demand in England is an increasing quantity, and is likely to approach last year's record; but it is still rather early for that in Scotland. London does not derive so much direct advantage from the home consumption; the bulk of the output being actually produced in London. Consequently this is just now the weakest market. There is nothing special to note in the forward position. There is speculative offering abroad for April delivery at some discount on spot prices, and further ahead at a discount of 2s. 6d. to 5s. per ton.

Nitrate of Soda is steady at 7s. 6d. per cwt. for fine quality on spot.

LONDON, *April* 7.

Tar Products.—The outlook in this market is deplorable. All the lighter products are weak and unsaleable, excepting at ruinous prices. New quantities of benzol coming upon the market has caused a perfect collapse—in benzols particularly. Creosote continues in good request, and stocks keep low; while there is a fair demand for grease oils. Carbolic acid is steady; and though no business of importance is noted in anthracene, that product is held for the Committee's price.

Market values for the week are: Tar, 12s. to 15s. Pitch, east coast, 19s. 6d.; west coast, 16s. 6d. Benzols, nominal, 90's, 1s.; 50's, 1s. 2d. Toluol, 1s. 4d. Solvent naphtha, 1s. 2½d. Heavy naphtha, 1s. Crude, 30 per cent., naphtha, 5d. Creosote, 2½d.; liquid, 3d. Heavy oils, 40s. to 50s. Carbolic acid, 60's, 2s. Naphthalene, 50s.; salts, 30s. Anthracene, "A," 5½d.; "B," 4½d.

Sulphate of Ammonia.—Very little business is apparently being done, although important shipments continue to be made, on contracts entered into some time ago. A great disparity exists as to value—dealers only offering £8 10s., while sellers are now asking £8 15s. to £8 17s. 6d., less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The most noticeable feature in the coal trade of this district during the past week has been a strong upward move in the shipping prices for all descriptions of round coal, owing to the extra inquiries that have been coming forward on South Wales account as a result of the strike in that district. On the ordinary regular shipping trade from Mersey ports, prices have been put up 1s. to 1s. 6d. per ton; 8s. 6d. to 9s. 6d. being now the minimum figures for delivery at the Garston Docks or the High Level, Liverpool. On special inquiries from outside customers, to cover their temporary requirements during the stoppage of the South Wales pits, advances of 2s. 6d. up to 5s. per ton on recent quotations have been asked. Sales have been made at about 11s. 6d. to 12s. 6d. per ton; some quotations being as high as 15s. for good qualities of steam coal, delivered at ports on the Mersey. Of course, this inflation of prices can only be temporary, as there is no expectation that the present dispute will be of a protracted character. But it will have its effect upon the inland prices for common round coal, by getting rid of surplus supplies, and checking any downward move. Though there has been no really quoted advance on the pit prices for steam and forge coals to regular customers, they have hardened up to about 6s. 6d. per ton as the minimum; and colliery owners have been declining to enter at present into forward contracts at current rates. Whether this may have any further effect upon prices of gas-making coals, is perhaps doubtful; but, at any rate, it is at present decidedly strengthening the position of colliery owners. House-fire qualities are also maintaining a very steady tone at late rates; 10s. to 10s. 6d. per ton at the pit being still the average figures for better qualities, 8s. 6d. to 9s. for medium, and 7s. for the commoner sorts. Engine classes of fuel are generally maintained at late prices; but during the past week there have been increasing quantities of slack coming in from Yorkshire and Derbyshire, and these ample supplies will, of course, check any upward move in engine fuel.

Northern Coal Trade.—There has been an increased and excited trade in coals during the past few days, owing to the strike in South Wales driving the demand to other coalfields. It has been chiefly for steam and bunker coals; but gas coals for distant parts have also been in demand. High prices have thus ruled for coal that could be early delivered. Best Northumbrian steam coals have sold as high as 15s. per ton, for a small quantity; second class steam have realized 13s. 6d. per ton f.o.b.; and steam smalls are quoted at 6s. 6d. per ton—prices that show advances of from 2s. 6d. to 5s. 6d., where they can be delivered in time to meet pressing and immediate requirements. Bunker coals have also risen, as many steamers have been diverted to these ports; and up to 9s. 9d. per ton f.o.b. has had to be paid to secure supplies. In gas coals, the settlement of the South Metropolitan Gas Company's supplies on the basis of 6s. 9d. to 6s. 10½d. per ton, is now officially confirmed. For one or two lots of gas coals for the pressing needs of south-western towns much higher prices have been asked and paid; but there are still coals in abundance—the local consumption having fallen. In gas coke, the shipments are rather heavier, but there is no alteration in prices.

Scotch Coal Trade.—The coal trade of Scotland has been thrown into a flutter of excitement by the stoppage of work in Wales. Scotch coal is being eagerly inquired after—indiscriminately as regards class; and it is therefore impossible to give the customary quotations. In the middle of last week, no coal could be had for shipping under 10s. per ton. For home consumption, about 9s. 6d. per ton was quoted. The miners in Scotland are being urged by their leaders to take advantage of the spurt in order to obtain an advance of wages; but hitherto the men have worked steadily, and have shown no disposition to agitate. The shipments for the week amounted to 133,178 tons—a decrease of 1245 tons, compared with the preceding week, and a decrease compared with the corresponding week of last year, of 3298 tons. For the year to date, the total shipments have been 1,681,684 tons—an increase upon the corresponding period of last year of 30,244 tons.

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Stratford-upon-Avon Water Supply.—Last Tuesday, an inquiry was held at Stratford-upon-Avon in regard to an application by the Corporation to borrow £11,832, of which £8300 is to complete the purchase of an estate at Snitterfield, in the vicinity of the water-works. With reference to this item, Alderman Colbourne, the Chairman of the Water Committee, said the Estate formed part of the gathering-ground of the water-works, and it was highly desirable that it should be under the control of the Corporation as regarded its cultivation. A tenant might cultivate in such a manner as would be highly injurious to the water supply of the town; and when the estate came into the market a short time ago the Corporation resolved to purchase it. There was no opposition.

Cost of the Bilston Water-Works.—Colonel W. L. Coke held an inquiry at Bilston last Thursday week, on behalf of the Local Government Board, into an application by the District Council for sanction to borrow £7000 for the purposes of water supply. Mr. Wassell (the Clerk) explained that Bilston, which was formerly supplied by Wolverhampton, had in recent years established water-works for themselves, and now supplied their own township, as well as a part of the Coseley district, and a portion of the Seisdon district—including Wombourn, Seisdon, Woodford, Trysall, and Himley. Mr. Baldwin Latham stated that the works were originally intended for Bilston only; but there was such an abundance of water that the Council had added another district. Mr. Wassell put in a statement of the estimated cost of the water-works, which amounted to £53,750; the actual cost being £59,819. The Council were perfectly satisfied with the work; and the loan now asked for was to cover the difference between the actual and the estimated cost, and £655 for a house for the Resident Engineer. Mr. Latham also gave evidence with respect to an outlay of £850 for providing telephonic communication between the Town Hall and the works. There was no opposition.

Sales of Shares.—At the Mart, Tokenhouse Yard, E.C., on Monday last week, Mr. Alfred Richards conducted a satisfactory sale of gas and water stocks and shares. The first lots consisted of a new issue, by order of the Directors, of 3 per cent. perpetual debenture stock of the Maidstone Gas Company. It was put up in £100 and £50 lots, but only a portion of the former were sold, at par. Another new issue—some 5 per cent. preference stock of the Hornsey Gas Company—fetched an average of £135 2s. 4d. per £100 lot; returning the purchaser, who takes the interest from the 18th inst., £3 14s. per cent. on his investment. The £5000 offered realized £6756. A few fully-paid £5 "B" shares (7 per cent.) in the Romford Gas Company were purchased for £10 5s. each—a "record" price. Some £10 fully-paid shares in the Ascot District Gas Company, on which 3¾ per cent. is being paid, were sold at £8 15s. each. A parcel of original £10 shares in the Bournemouth Gas and Water Company, the last dividend on which was at the rate of 13 per cent. per annum, were purchased for £31 10s. apiece; some "B" shares (7 per cent.) fetching £18 10s. each. Several £10 "A" (10 per cent.) shares in the Walton-on-Thames Gas Company, the last dividend on which was at the rate of 7 per cent. per annum, changed hands at £18 each. On Wednesday, Messrs. Edwin Fox and Bousfield sold at the Mart some £5 shares in the Cobham Gas Company at par. Last Wednesday, Mr. H. J. Lloyd sold £30,000 of new ordinary stock of the Wolverhampton Gas Company, at prices ranging from £130 to £135 per £100 of stock. The sale produced a little more than £40,000—a premium of about £10,000 on the face-value of the stock. This is the highest amount ever obtained for gas stock in Wolverhampton.

Bristol Water-Works Company.—Presiding at the recent annual general meeting of this Company, the Chairman (Mr. Edward Bush) stated that there had been an increase of £3667 in the revenue. This, he thought, must be very satisfactory to the shareholders, especially seeing that their expenses had barely increased £100. There had been a saving at Chelvey of £3103. The last year was different to its predecessor; for in 1896 they had an expensive time, owing to the dry summer, which resulted in the pumping at Chelvey costing above £6000. Rates and taxes were going up more and more every year. The increases had amounted to £5000 or £6000; and since the city had been enlarged, the rates had still further been augmented. There was a limit to patience; and the Company, acting on legal advice, intended to appeal against the latest rating. The Yeo works were progressing, and were now within measurable distance of completion. He moved the adoption of the report, which was seconded by Mr. H. N. Abbot, who remarked that the position of the Company was such as might almost be described as ideal. Ten years ago their income was £80,000; now, it was £114,000—the yearly increment being £3400. The motion was adopted; and the usual dividends were declared.

The business of Messrs. Goodson and Co., gas governor and burner makers, is now carried on at the Gaslight Works, 13, Maze Pond, St. Thomas's Street, London Bridge, S.E.

The Birmingham Corporation have placed with Messrs. E. Cockey and Sons, Limited, an order for one of their improved centre-valves for 24-inch connections, to work either one, two, three, or four purifiers.

Messrs. Kirkham, Hulett, and Chandler have lately received several orders for their patent "Standard" washer-scrubbers; among them being machines for Staines, Redditch, Southend, and Pelton Colliery.

Messrs. R. Laidlaw and Son, of Edinburgh and London, have received an order from the Glasgow Corporation Gas Commissioners to supply two station meters, each capable of passing 150,000 cubic feet of gas per hour, for the Dawsholm works.

Mr. R. L. S. Badham, Parliamentary Agent, the Secretary of the Provincial Water Companies' Association, asks us to notify that on and after Thursday, the 14th inst., his own and the business of the Association will be carried on at 1, Victoria Street, Westminster.

The Leeds Fire-Clay Company, Limited, have obtained contracts for the erection of their Shallow Regenerator Settings at the Whitworth Gas-Works and at the Yeadon and Guiseley Gas-Works. The contracts include the removal of the old direct-fired settings, the necessary excavations and foundations, and all bench and retort ironwork complete.

After a successful tour through Yorkshire, giving cookery demonstrations with Messrs. C. Wilson and Sons' gas-stoves, Madame Alting-Mees recently delivered some interesting lectures at Smethwick for the Cannon Hollow-Ware Company, which were numerously attended. Madame Alting-Mees has arranged several autumn and winter tours for foreign gas companies.

Messrs. R. & A. Main, Limited, have lately held a series of highly successful exhibitions in Salford and Manchester; Miss Burden lecturing to large and appreciative audiences. They were also exhibiting last week in the Albert Hall, Edinburgh; and during the same time, Messrs. John Wright and Co., Limited, had a display of their manufactures at the Literary Institute in that city.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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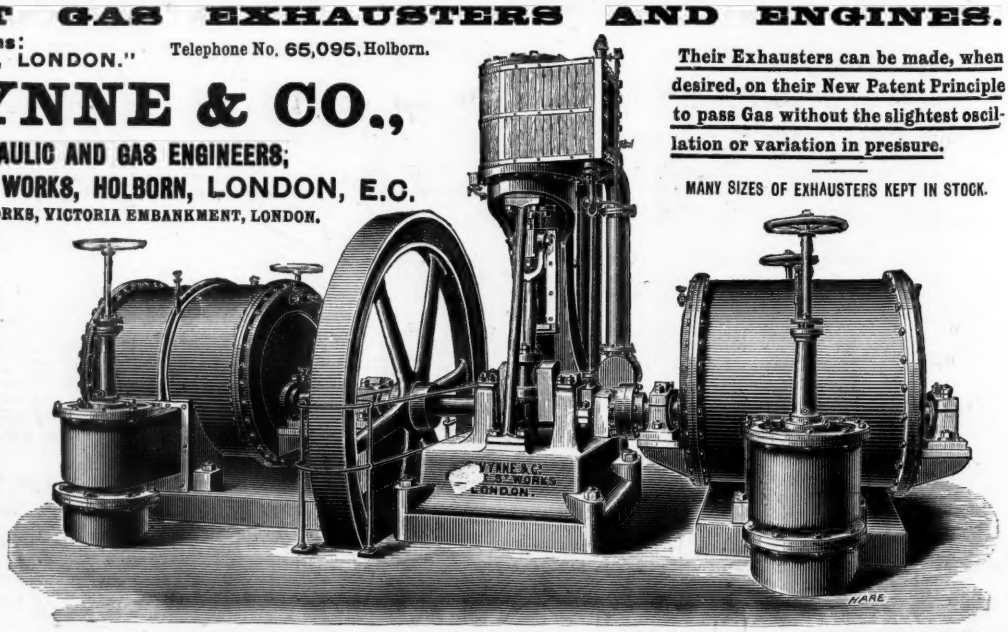

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READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

IMPORTANT.

OLD Retorts made equal to new by repairing them with CROWTHER'S PATENT STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Can be used in Hot or Cold Retorts; and "A 1." for Mouthpiece Joints. Satisfaction Guaranteed.
CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see April 5, p. 794.]

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

LLEWELLYN JONES & T. B. YOUNGER, CONSULTING ENGINEERS, VALUERS, &c., CHESTERFIELD HOUSE, 98, GREAT TOWER STREET, E.C.

Price 2s., Post Free.

STEPHEN CARPENTER, on the PURIFICATION OF COAL GAS BY LIME, OXIDE OF IRON, AND ATMOSPHERIC AIR, and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.
S. CARPENTER, Ryde House, 28, Woodhouse Grove, East Ham, ESSEX.

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.
And J. EVERY AND SON, Phœnix Iron-Works, LEWES.

CLERK OF WORKS, &c.

WANTED, an Engagement as above. First-class Experience on several large Gas and Residual Works under leading Engineers; fair Draughtsman; used to control of Men. Steady, reliable, and excellent References.
Address No. 3033, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Retort Setters.
Apply to the LEEDS FIRE-CLAY COMPANY, LIMITED, Engineering Department, Wortley, LEEDS.

DRAUGHTSMAN wanted. State Age, Experience, and Salary required.
Apply to JONAS DRAKE & SON, Gas Engineers, HALIFAX.

WANTED, at May-day, a Working MANAGER for small Gas-Works. Make 21 millions. Generator System.
For further Particulars apply, with Testimonials, to J. J. BAILEY, Secretary, Gas Company, BARNARD CASTLE.

WANTED for the Gas-Works at Hungerford, Berks., a WORKING MANAGER to take charge of, and live on, the Works. Assistance will be afforded. Average make 3 millions yearly.
Apply by letter only, stating Wages required, Age, Qualifications, and References, to the SECRETARY.

THE Marsden Urban District Council are prepared to receive applications for the position of GAS MANAGER.
The annual production of Gas is 15 million cubic feet.
Particulars of Duties, &c., may be obtained from the Chairman of the Gas Committee, Marsden, to whom written applications must be sent not later than Friday, the 15th inst.
Canvassing Members of the Council prohibited.
Marsden, near Huddersfield,
April 4, 1898.

CITY OF MANCHESTER.

ASSISTANT GAS-METER TESTER.

AN Assistant wanted in the Gas-Meter Testing Department. Wages 25s. per week. Candidates must be under 30 years of age, and experienced in the work.
Applications with Testimonials to be sent, on or before the 16th inst., to
HARRY ROBSON,
Clerk to the City Justices.
City Police Courts,
Manchester.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed. Art Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

GENERAL Foreman required at a medium-sized Gas-Works in Midlands. Must be a trained Mechanic. One accustomed to Gas-Works preferred. Salary £2 10s. per week.
Applications, before the 14th of April, stating Age and References, to No. 3032, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Foreman over Main and Service Pipe Layers. Must be steady and reliable, and have had experience in laying large Mains.
Apply, by letter, with *copies* only of Testimonials, to the undersigned.
BENJAMIN HAYNES,
Secretary.
Gas Company, Stretford,
near Manchester.

METER INSPECTOR AND FITTER.

WANTED, an energetic reliable person as METER INSPECTOR and FITTER. He must be thoroughly acquainted with his duties, including laying Mains, doing general Repairs, and advising Consumers as to their Gas Supply.
Apply, in own handwriting, with References, and stating Experience, Age, present Occupation, and Wages required, to PHILIP HANMER, 137, London Road, Southborough, KENT.

WANTED, Carbon in 4 Ton Lots, or more.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PURIFIERS, &c., WANTED.

WANTED, a Four or Six Set of second-hand PURIFIERS, in good condition, not less than 20 feet square. Also a set of WROUGHT-IRON ANNULAR CONDENSERS, ½ to 1 Million capacity, either in single or double set.
Apply, in first instance, to No. 3034, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CEFN MAWR AND RHOSYMEDRE GAS COMPANY, LIMITED, RUABON.

WANTED, Two Second-hand Purifiers, about 8 feet or 10 feet square, with 18-inch lutes and 6-inch or 8-inch Valves and Connections.
State correct Price, with full Particulars, and where to be seen, to
W. A. CARTWRIGHT,
Secretary.

EXHAUSTER for Sale, second-hand, Waller double-blade, capable of passing 17,000 cubic feet per hour. Price £15.
Apply to Mr. COOPER, Gas-Works, BANBURY.

FOR SALE—12-inch Governor by Peebles. 42 4-inch White's ANTI-DIP VALVES. No reasonable offer refused.
Apply to the MANAGER, Gas-Works, ILKESTON.

ON SALE—Cast-Iron Ascension-Pipes, DIP-PIPES, MOUTHPIECES, VALVES, &c.
Further Particulars on application to
T. DUXBURY,
Manager.
Gas-Works, Middleton,
near Manchester.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

FOR SALE—A Modern Sulphate of AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 5000 to 6000 lbs. of Sulphate per day.
For further Particulars, apply to the BRYMBO STEEL COMPANY, LIMITED, near WREXHAM.

FOR SALE, Cheap—The undermentioned GAS PLANT:—

		Square. Ft. in.	Deep. Ft. in.		
2	PURIFIERS,	8 0	4 6	6-in.	Valves & Connections.
1	"	7 6	4 6	6 "	" "
2	"	5 0	4 0	4 "	" "
1	"	5 0	2 9	4 "	" "

C.-I. SCRUBBER, 38ft. 6in. high, 6ft. dia., 14-in. "
CONDENSER, 4 inches diameter, Vertical Pipes.
EXHAUSTER (Gwynne's) 20,000 c.f. per hour 8-in. Valves
Apply to SAML. WHILE AND SONS, 60, QUEEN VICTORIA STREET, E.C.

BOROUGH OF COLNE,
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of 500 yards of 14-inch CAST-IRON GAS-MAINS (uncoated).

Further Information can be obtained from the undersigned, to whom Tenders, endorsed "Mains," must be delivered on or before Saturday, the 23rd day of April, 1898.

HY. SIMMONDS, C.E.,
Engineer and General Manager.

Engineer's Office, Gas-Works,
Colne, April 7, 1898.

BOROUGH OF COLNE,
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the surplus TAR made at their Works during the Year ending March 31, 1899. Estimated quantity 700 Tons.

Tenders, endorsed "Tar," to be delivered to the undersigned on or before Saturday, the 23rd day of April, 1898.

HY. SIMMONDS, C.E.,
Engineer and General Manager.

Engineer's Office, Gas-Works,
Colne, April 7, 1898.

BOROUGH OF HEYWOOD,

THE Gas Committee invite Tenders for the supply of about 11,000 Tons of COAL per annum for One, Two, or Three Years.

Specification and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.

Sealed Tenders, marked "Coal," to be sent to me not later than Tuesday, April 19, 1898.

By order,
J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
March 16, 1898.

CORPORATION OF BLACKPOOL.

THE Gas Committee are prepared to receive TENDERS for the making of a BRICK and PUDDLE GASHOLDER TANK, 152 feet diameter, on the present Gas-Works Site.

Plans, Specifications, and Conditions may be seen at the Office of the undersigned.

Tenders, endorsed, must be sent to the Chairman not later than the 25th of April.

The lowest Tender not necessarily accepted.

(Signed) JOHN CHEW,
Gas Engineer.

Gas Office, Princess Street,
Blackpool, April 6, 1898.

WALLASEY URBAN DISTRICT COUNCIL,

TO COLLIERY PROPRIETORS AND OTHERS.

THE Wallasey Urban District Council are prepared to receive TENDERS for the supply of about 26,000 Tons of CANNEL and GAS COAL for their Gas-Works, delivered in Trucks at Duke Street, Birkenhead, separately, for One, Two, or Three Years from the 30th of June next.

Specifications and any further Information may be obtained on application to the Engineer at his Office at the Works, Great Float, near Birkenhead.

Sealed Tenders, addressed to the Chairman of the Gas, Water, and Electricity Committee, and endorsed "Tender for Coal and Cannel," to be left at my Office, as below, not later than Four o'clock in the Afternoon of Thursday, the 21st inst.

The Contractors will be required to enter into a bond, with approved sureties, for the due performance of the Contract.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
H. W. COOK,
Clerk to the Council.

Public Offices: Egremont, Cheshire,
April 7, 1898.

WALLASEY URBAN DISTRICT COUNCIL.
GAS, WATER, AND ELECTRICITY COMMITTEE.

CONTRACTS FOR STORES.

THE Wallasey Urban District Council are prepared to receive TENDERS to supply, for a period of Twelve Months, from the 30th of June next, the following among other ARTICLES; being the principal Stores required for the use of their Gas, Water, and Electricity Works, viz.:—

STOPCOCKS, MAIN-TAPS, FERRULES.	OILS.
FIRE-BRICKS and RETORTS.	LEAD and WROUGHT-IRON PIPES, CAST-IRON MAIN PIPES.
FIRE SPADES and COAL SHOVELS.	COTTON WASTE.
IRON (BAR, SHEET, and PLATE).	GAS & ELECTRICITY METERS.
LIME.	LAMP COLUMNS.
CABLES.	SWITCHES and CUT-OUTS.
WATER-METERS.	COPPER LAMPS, &c., &c.

Further Particulars, with Forms of Tender, may be had, and Samples inspected, on application at the Engineer's Office, Great Float, near Birkenhead.

Sealed Tenders, which must be on the printed form, properly endorsed, and addressed to the Chairman of the Gas, Water, and Electricity Committee, to be left at my Office, as below, not later than Four o'clock in the Afternoon of Thursday, the 21st inst.

The Contractors will be required to enter into formal contracts, and may also be required to give security, in conformity with the Public Health Act, 1875.

The Council reserve the power to accept the whole or part of a Tender, and do not bind themselves to accept the lowest or any Tender.

By order,
H. W. COOK,
Clerk to the Council.

Public Offices: Egremont, Cheshire,
April 7, 1898.

THE Directors of the Worksop Water Company invite TENDERS for a WROUGHT-IRON TANK, 27 ft. by 30 ft. by 10 ft. deep, to be supplied and fixed at Worksop according to Plan and Specification, to hold about 50,000 gallons.

The Directors do not bind themselves to accept the lowest or any Tender.

Tenders to be delivered on or before the 30th inst., endorsed "Tender for Wrought-Iron Tank."

Further Particulars may be obtained from the Engineer, Mr. H. A. COLLINGWOOD, 5, Eastgate, WORKSOP.

CANTERBURY GAS AND WATER COMPANY.

TENDERS FOR GAS COAL.

TENDERS are invited for the supply of best NEWCASTLE GAS COAL for One, Two, or Three Years at the Purchasers' option, commencing on the 1st of June next.

Forms of Tender, containing full Particulars as to the Quantities required and Conditions of the Contract, may be obtained on application to the undersigned.

Sealed Tenders, endorsed "Coals," to be delivered at the Company's Offices, on or before Saturday, the 23rd of April inst.

JAMES BURCH,
Secretary.

39, Castle Street, Canterbury,
April 4, 1898.

COUNTY BOROUGH OF BURY.

TO SULPHURIC ACID MAKERS.

THE Gas Committee of the Bury Corporation are prepared to receive TENDERS for the supply of about 350 Tons of SULPHURIC ACID for the manufacture of Sulphate of Ammonia for a period of One Year from the 1st day of May, 1898.

Form of Tender and Conditions may be obtained on application to the Engineer and Manager, Gas-Works, Bury.

Sealed Tenders, endorsed "Tender for Acid," to be sent to me, the undersigned, on or before Monday, the 25th of April, 1898.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bury,
April 7, 1898.

BOROUGH OF MACCLESFIELD.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve Months commencing the 1st day of May next.

Tenders for the Tar or Liquor, separately, to be sent in not later than Saturday, the 16th of April, 1898, addressed to the Chairman of the Gas Committee, Town Hall, Macclesfield, and endorsed "Tender for Tar," &c.

For Conditions apply to Mr. Newbigging, Engineer, Gas-Works, Macclesfield.

The Committee reserve to themselves the right of accepting any Tender for the Tar or Liquor separately.

The highest or any Tender not necessarily accepted.

W. FREDK. TAYLOR,
Town Clerk.

March 14, 1898.

LIVERPOOL UNITED GASLIGHT COMPANY.

TENDERS FOR CANNEL AND COAL.

THE Directors of the Liverpool United Gaslight Company are prepared to receive TENDERS for the supply of 70,000 Tons of CANNEL, and 105,000 Tons of COAL, to be delivered at the various Works of the Company during the period of Twelve Months between the 1st of July, 1898, and the 30th of June, 1899.

Tenders will be received for the whole or any portion of the above quantity.

The Directors reserve the right to accept Tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

Full Particulars and printed Forms of Tender can be obtained, on application to the undersigned, at the Gas Office, Duke Street, Liverpool, to whom Tenders (on the printed form only) must be delivered at or before Ten a.m., on Wednesday, April 20, endorsed "Tender for Cannel and Coal."

By order,
WILLIAM KING,
Engineer.

Gas Office, Duke Street, Liverpool,
March 25, 1898.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

SALE OF FIVE PER CENT. PREFERENCE STOCK.

NOTICE is Hereby Given, that the Directors have instructed Mr. ROBERT MACK, Auctioneer, to SELL BY AUCTION, at the Offices of the Company, Grainger Street West, Newcastle-upon-Tyne, on Wednesday, the 20th day of April, 1898, at Twelve o'clock noon precisely, £26,600 of the NEWCASTLE-UPON-TYNE and GATESHEAD GAS PREFERENCE STOCK, bearing a fixed Preferential Dividend of 5 per cent. per annum, being part of the moneys authorized to be raised by the Newcastle-upon-Tyne and Gateshead Gas Act, 1896.

For Conditions of Sale and further Particulars, apply to the undersigned.

THOS. WADDOM,
Secretary.

Gas Office, Newcastle-upon-Tyne,
March 28, 1898.

IMPERIAL CONTINENTAL GAS ASSOCIATION,
INCORPORATED BY ACT OF PARLIAMENT.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 3rd day of May next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 31st of December last, and the usual Ordinary Business of such Meeting transacted.

Notice is Hereby also Given, that the CAPITAL STOCK TRANSFER BOOKS WILL BE CLOSED from the 19th inst. to the 3rd of May, both days inclusive.

The Dividend will be paid on the 10th of May.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
April 9, 1898.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of the above Company will be held at the Offices of the Company, 80, Gracechurch Street, in the City of London, on Tuesday, the 3rd day of May next, at Three o'clock in the Afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st day of December last, to elect a Director and an Auditor in place of those retiring by rotation, to limit the number of Directors to five, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 20th inst. to the 3rd prox., both inclusive.

By order of the Board,
SAMUEL WOOD,
Secretary.

Offices: 80, Gracechurch Street,
London, April 5, 1898.

PUBLIC SALE
AT THE END OF APRIL
OF A
COAL-TAR DISTILLERY
SITUATED AT AMSTERDAM.

THESE Works are completely arranged for the distillation and working up from 10,000 to 15,000 Tons of Coal Tar, and are capable of a further enlargement to 20,000 Tons a year.

They are situated on the Westering Canal between the Amstel and the Y, and are accessible for Ships and Barges with a draught of about 8 feet.

The Superficial Area is about 15,000 square metres, very favourably situated within the limits of the Commune of Amsterdam.

For further Information, inquiries to be addressed to THE SOCIETY OF CHEMICAL INDUSTRY, Frederiksplein 5, AMSTERDAM.

During the Year 1898, Contracts are open at different Gas-Works in Holland for a quantity of about 16,000 Tons.

Creosote Oil for the preparation of Timber, much employed in this country, is protected by an import duty of fl.5 per ton.

N.B.—About 9000 additional square metres of Land adjoining can also be purchased.

PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 TO 1888.

NOTICE is Hereby Given, that Ulrich Kesselring, of Rue du Midi, St. Imier, Switzerland, has APPLIED FOR LEAVE TO AMEND THE SPECIFICATION OF THE LETTERS PATENT No. 9714 of 1897, for "An Improved Apparatus for the Manufacture of Acetylene Gas."

Particulars of the proposed Amendments were set forth in the "Illustrated Official Journal (Patents)" issued on the 30th March, 1898.

Any person or persons may give Notice of Opposition to the Amendment (on Form G), at the Patent Office, 25, Southampton Buildings, London, W.C., within One Calendar Month from the date of the said "Journal."

C. N. DALTON,
Comptroller-General.

PHILLIPS AND LEIGH,
22, Southampton Buildings,
Chancery Lane, W.C.,
Engineers and Patent Agents.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

Now Ready, Price 15s., Limp Cloth, the

SEVENTEENTH YEARLY

ANALYSIS OF THE ACCOUNTS

OF THE

METROPOLITAN WATER COMPANIES.

Compiled and arranged by

ALFRED LASS, F.C.A.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

GAS PURIFICATION BY
HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD.,
CANAL ST., MILES PLATTING, MANCHESTER.

THOMAS TURTON

AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

Telephone: Castleford No. 214. | Postal Address: Castleford.

Telegrams: "Silkstone Castleford."

THE SILKSTONE & HAIGH MOOR

COLLIERIES, LTD.

ALLERTON BYWATER, CASTLEFORD.

Steam, Manufacturing, & Gas Coals & Cannel.

Analysis, Contracts, Trial Waggons, and Quotations for Large and Small Orders. Inquiries Solicited.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S

COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

BOWENS' Ltd. Successors,

STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.

Established 1860.

OSLER,

BIRMINGHAM.

MANUFACTURERS
OF GASELIERS
IN GLASS AND METAL.

REGENERATIVE RETORT-SETTINGS.

J. FIRTH BLAKELEY & CO., GAS ENGINEERS AND CONTRACTORS, RAVENSTHORPE, YORKS,

Have made arrangements with Mr. ALEXANDER YUILL, of Alloa, N.B., for the SOLE RIGHT of BUILDING his REGENERATIVE FURNACES and SETTINGS OF RETORTS.

By Mr. Yuill's Principle, the maximum quantity of Gas per Retort per diem may be obtained with the minimum amount of fuel.

Gas Managers who are desirous of improving their Settings should ask for Particulars and Prices before adopting any other principle. They give the best results, are reliable, and economical in construction.

GAS APPARATUS OF ALL KINDS SUPPLIED.

G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY,

Manufacturers of MACHINE-MADE RETORTS and

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.

For Prices and Analysis, apply as above.

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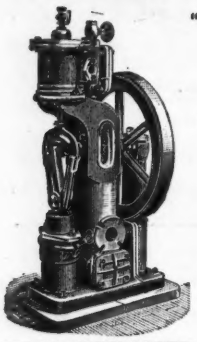


Fig. 703. "SINGLE RAM" STEAM-PUMP.

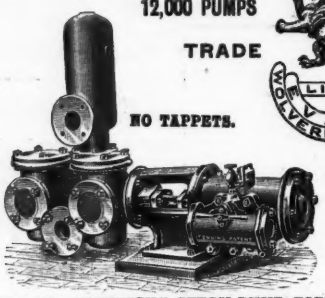


Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

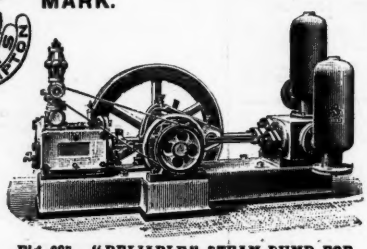
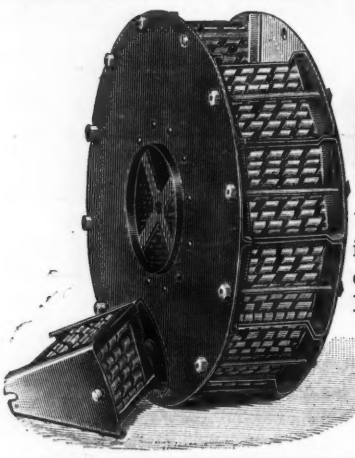


Fig. 688. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.



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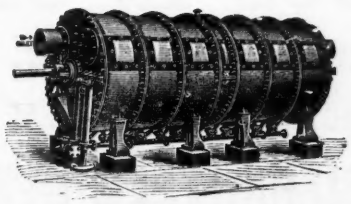

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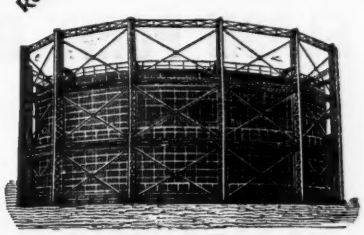

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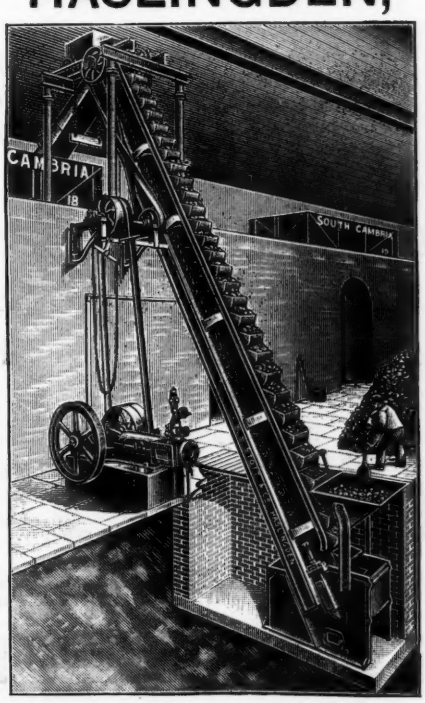

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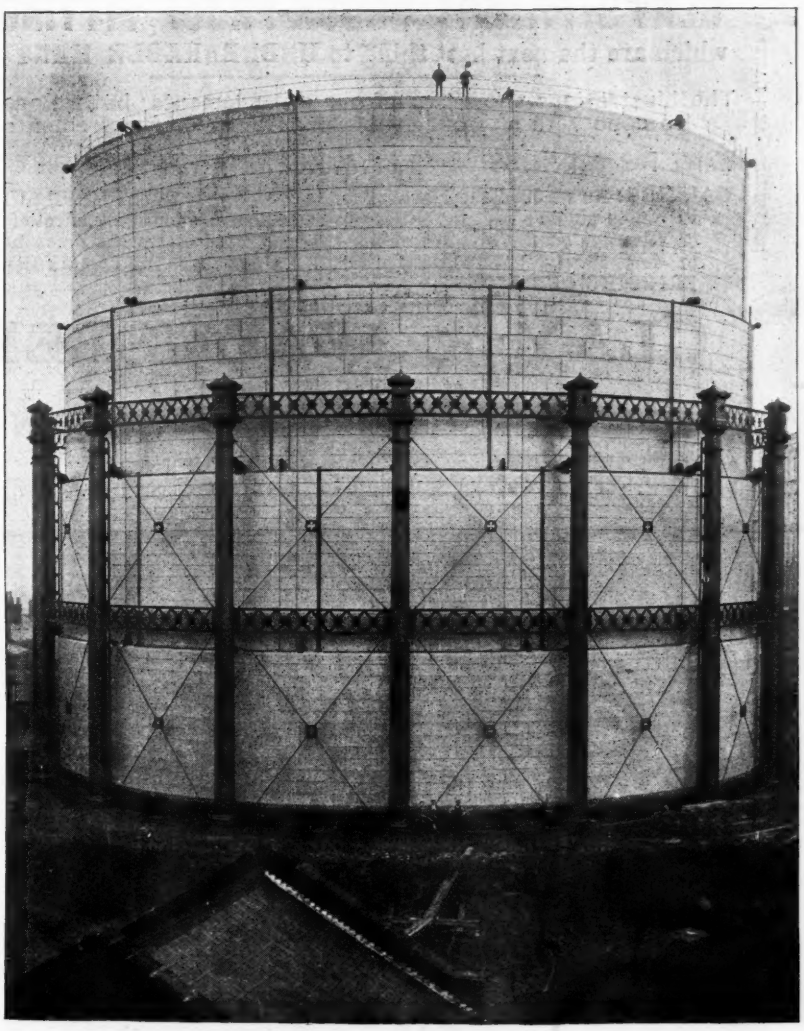

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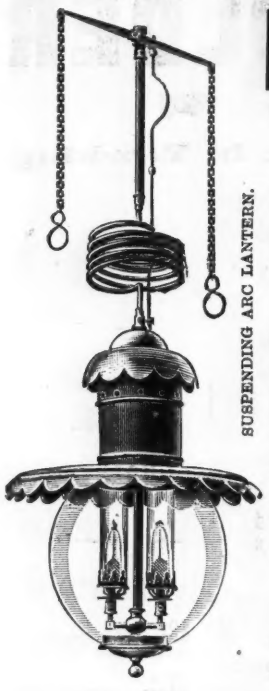

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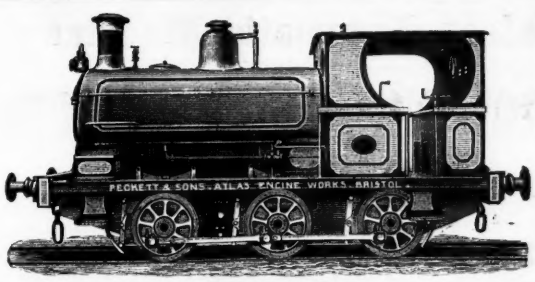

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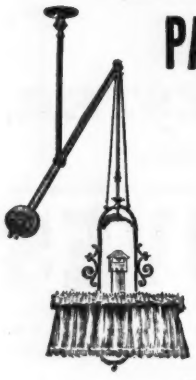

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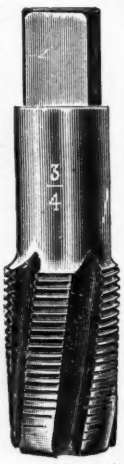

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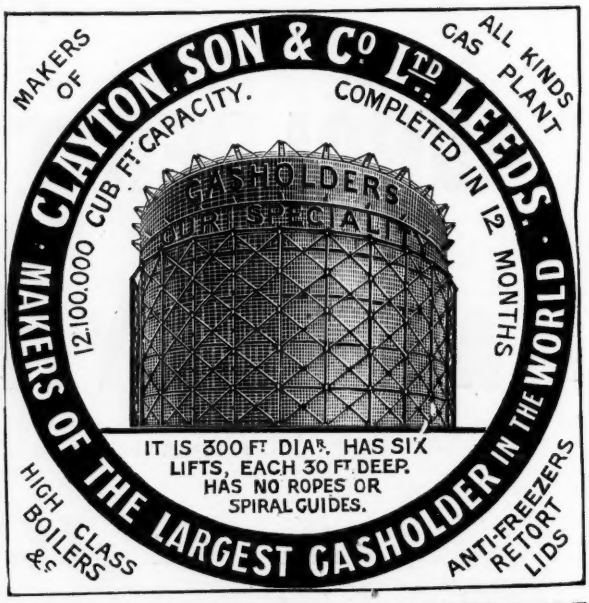
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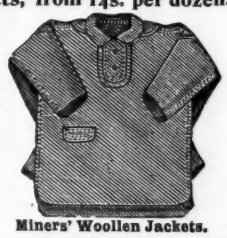
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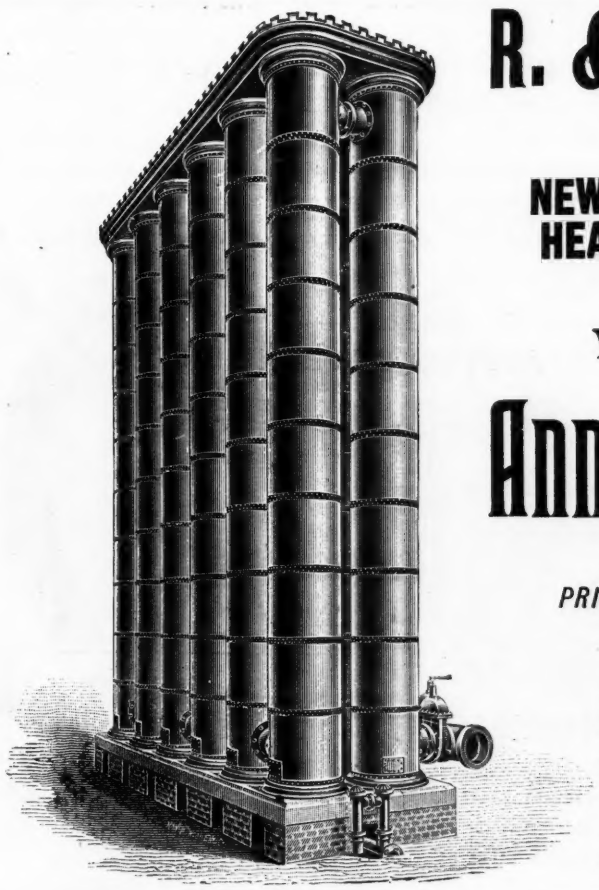

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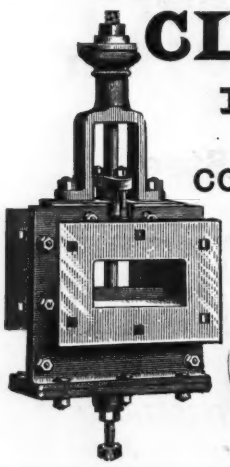

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